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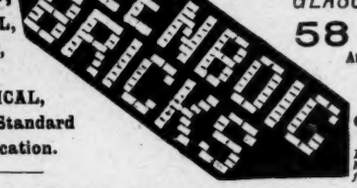

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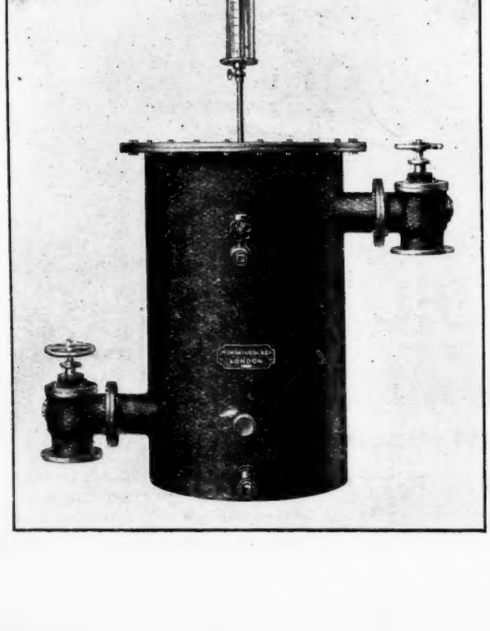

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VOL. CXLVI., No. 2922.] TUESDAY, MAY 13, 1919. [71ST YEAR.

EDITORIAL NOTES.

The New President of the Institution.

THERE will have been great satisfaction throughout the gas profession in learning that Sir Dugald Clerk, K.B.E., F.R.S., D.Sc., has accepted the invitation of the Council of the Institution of Gas Engineers to succeed Mr. Samuel Glover in the presidency; and the members will be grateful to Mr. Thomas Goulden and Mr. Thomas Hardie, the Vice-Presidents, for delaying for a further period their own enjoyment of the highest distinction their colleagues can confer upon them. Sir Dugald is one of those men, having close association with their work, whom gas engineers delight to honour. He is not only a distinguished scientist, world-famed, but he is one for whom we have all a great affection as a man. His early work in connection with the gas-engine led him to make an intimate study of the physical, chemical, and engineering problems associated with gas production and use; and, as a result, his penetration into the future of gas manufacture and supply went many years ago farther and deeper than that of the foremost men directly working in the industry. This can be seen by reference to the paper he read before the Gas Institute, seventeen years since, on "Large Gas-Engines and the Gases used "by them;" his adhesion to the then formed views is found in his Royal Society of Arts paper; the beginning of their realization is seen in what has been done during the war, and in the report which Sir George Beilby and his colleagues of the Fuel Research Board have made, recommending that the industry be given more freedom in serving the interests of the community and industry generally. It was in 1902 that Sir [then Mr.] Dugald Clerk, in the paper alluded to, referred to the incandescent mantle, and remarked that "the welfare of the coal-gas manufacturing "industry requires the production of a gas which will "satisfy alike the requirements of light, gas-power, and "gas-heating." Towards the end of the paper, he spoke as follows: "Is it not possible to produce a cheap gas for "town purposes, capable of incandescing Welsbach mantles, "supplying gas-engines, and gas cooking and heating appa-"ratus? . . . A gas giving only 10 or 12 candles per c.ft. "when burned in the old way, would still give the maxi-"mum temperature required for successful incandescent "lighting; and such a gas would be eminently suited for "gas-engine purposes. Say that cheap coal could be used "for producing the gas, and, if water gas were mixed with "it, no enriching oils would be required, it is surely worth "the consideration of gas engineers to see whether a town "supply could be given on such a scale." Just consider then and now. Then there were many professional gas men who thought that Sir Dugald was taking a flight into dangerous regions, but what his analytical and presbytic mind then suggested is now the accepted way, and is materializing, or will materialize with proper and persevering action. That Sir Dugald has not only remained staunch to the long-ago formed beliefs but has hardened his views, may be seen from the speech he made on the report of the Gas Investigation Committee at the Institution meeting last autumn, and his classical contributions to the subject of coal conservation and use through his Society of Arts paper and the report prepared conjointly with Professors Smithells and Cobb. At this time, when conditions have undergone change and are still changing, it is important to the industry to bring into action all the intellect, character, and influence it can command. There is, it will have been seen, a peculiar fitness in Sir Dugald being at the head of the technical part of the personnel of the industry during twelve months which will be weighted with so much of importance to the gas industry, and during which, it is hoped—it will not be without a struggle with obstructive forces—to see the Legislature ratifying the proposals for enabling the industry to render ever larger service, to the national advantage.

The Institution Programme.

THE preliminary official notices of the annual meeting of the Institution of Gas Engineers, with the pressing invitation for submission for consideration of further subjects for discussion, caused us to fear that the old error of overloading might be the result; but the agenda that has now been prepared should just about comfortably fit the time allotted to the sittings of May 27, 28, and 29, if it is not wasted by a lot of lax talking. Some of the contributions to the proceedings will be fairly heavy, so that there will be all the more need for speakers to trim what they have to say down to something of genuine value, and so show that they can properly discriminate between loquacity and common sense. First among the items of prime importance will be the Presidential Address of Mr. Samuel Glover; and there can be confidence that it will be a deliverance of a diversified character. Never has President of the Institution stood with before him such a landscape of opportunity for the gas industry, and so there will be no lack of material for the address. Expectation is certain to be gratified. There will be the report of the Gas Investigation Committee. New work and fresh knowledge should produce here a document of considerable value. Looking forward as well as looking backward from the platform of present development, the subject of the education of the gas engineer is invested with a new importance. Many changes and developments in processes, practices, and obligations make their claims upon technical qualification; and the chief technical official of a gas undertaking must be fully equipped for the part he has to take in the future, which will be greater and more varied than the part he had to take in the past. Prof. Arthur Smithells will open a discussion on this subject of the education of the gas engineer. Mr. A. E. Broadberry will make a double appearance—as Chairman of the Refractory Materials Research Committee (whose report he will present), and as author of a paper dealing with the application of reinforced concrete to purifier construction. We had a taste last year of the excellence of the work of Messrs. J. G. Taplay and R. B. Parkinson in connection with gas-meter investigation; and the report of the Gas-Meter Research Committee will give us another "helping" from the same source. Dr. W. B. Davidson will have a hearty welcome in coming to tell us from personal knowledge of the inter-relation of the gas and dye industries; while Mr. H. Townsend will place on record his compilation of the war experiences of British gas undertakings, into which experiences he has been making an extended exploration. There will be considerable interest in all these matters. Nevertheless, there will be added pleasure that there is to be a revival this year of the reception and dance; and Mr. and Mrs. Samuel Glover may anticipate on the Tuesday evening the greetings of a large company of gratified guests.

The Most Suitable Standard Quality of Gas.

THIS was the title of a paper that Mr. J. H. Canning read at the meeting of the Welsh Institution last week; and the author showed a commendable prudence in avoiding altogether any prescription for universal application. If the report of the Board of Fuel Research means anything, and

it does mean a great deal to the gas industry, it is that we have now good authority—the Board of Trade has good authority—for asking Parliament to relieve the industry at once from a standard which is prejudicial to undertakings in doing what is best economically for their consumers. The inclination of Parliament, before they had this independent counsel from Sir George Beilby and his colleagues, was to apply a universal standard. Parliament has now been told plainly that this is economically unsound, as the circumstances, in coal, in coke markets, in gas-manufacturing conditions, and in gas requirements, vary so largely that the best cannot be done in the national interests—that is to say, in the utilization of coal and coke, and the provision of gaseous fuel for various purposes—if gas undertakings are held fast to one standard. We must not look back to what has been. It is noticed that one of the members, in the discussion on Mr. Canning's paper, referred to what Parliament has done. That does not to-day concern us in the least. What Parliament has done is the direct opposite to what the Board of Fuel Research have recommended Parliament to do. They have condemned the parliamentary method of dealing with the gas industry in this matter; and this is the important thing. It is upon this that we have now to take our stand, and not allow ourselves to be shifted from it by attempts that will be recklessly made by men obsessed by antiquated notions. We have there, with perhaps some modification of suggestions pendent to the main one—such as the strict limitation as to inerts (which is a too stringent refinement for all conditions)—the terms upon which business can be done in the future.

The main thing is to get the freedom that the Board of Fuel Research say should be the industry's, to enable it to render the best service; and then it will be for each gas undertaking to determine upon the calorific value of the gas that will most economically under their conditions give the best service to their consumers at the price charged, and to the interests of the undertaking the protection that they require. We need not now spend time in discussing as to whether consumers will be content with 400 or 450 or any other calorific power. Freedom, economy, and protection are the paramount points for the moment, with every gas manager carefully considering the character of the gas that he can supply under the present or contemplated improved work's conditions, so that no unpleasant surprises are sprung on him when a still further move is made in this matter. Mr. Canning has come to practically the same conclusion as the Board of Fuel Research, that the most suitable quality of gas for general supply is that which, having full regard to the circumstances of time, place, and other contingencies, will provide a satisfactory and efficient supply of light, heat, and power to the consumers at the lowest possible price.

Nor, if we want the freedom for development that the Board of Fuel Research proposes, is there much advantage in discussing whether or not the change shall be made in the basis of charge from volume to heat energy, unless we can show the Board that there is at hand a better safeguard for the gas consumers in return for the freedom which is suggested for the industry. The change in the method of charging provides the safeguard; and as we read the report of the Board of Fuel Research—mark this!—freedom can only be gained in exchange for the alteration in the basis of charge. There are difficulties no doubt—such as the case of the prepayment consumers. But difficulties must be overcome to realize the large economic advantage that freedom will confer. It is thought by Mr. Canning and others that the heat energy basis of charging will mystify consumers even more than the method of charging by volume. The average consumer does not really appreciate the cubic foot; but an educated consumer will soon get to know that buying B.Th.U. is a better form of transaction than purchasing cubic feet. The cubic foot of the gas of one town is not in point of value the cubic foot of the gas of another town; the British thermal unit, *cæteris paribus*, may be taken as of equal value.

Let us, however, if the change is made, have a unit of B.Th.U.'s which is large enough, and can be brought into ready comparison with the 3420 B.Th.U. of the electrical unit. In this, there will be excellent trading value. A unit of 10,000 B.Th.U. is about equal to three electrical units in thermal value. Mr. Canning suggests 1000 B.Th.U. as a convenient unit. We cannot agree. At 3s. per 1000 c.ft. of 400 B.Th.U. gas, 1000 B.Th.U. would work out to 0·09d. Fancy telling a consumer that the price of gas was 0·09d. per unit. He would look aghast at his informant; and mystified would not be the word for what he would feel. The unit must have some relation to the low-value coins of the realm. Mr. Canning has also been thinking over a nominal description for his 1000 B.Th.U. unit. "Kilo-"therm" or "Megatherm" are his suggestions. The former is not bad if the unit was an acceptable one; the latter—well, it's simply horrible, and for the consumer it would pile up the mystification which Mr. Canning fears.

The National Electricity Bill Introduced.

The claims upon the gas industry are not in these days limited by its own internal affairs, but a sharp look-out has to be kept upon external developments which may affect its interests. The long-awaited National Electricity Bill has now been introduced into Parliament; and we review its contents in other columns. If any stimulus were needed to induce the gas industry to make a very earnest attempt to set its own house in order, and to bring to its aid any and every economy which advancing knowledge has placed, and will place, in its possession, then this Bill gives it. The clauses of the Bill must not have any mere face-value placed upon them; it is what the powers in these clauses will produce that is the important thing. There must be no under-estimation by appearances. No one can positively know what plans will be developed from the wide authorization that it is now proposed to confer. At first blush, one might say that here we have a grandiose scheme that is going to cost an enormous amount of money to carry out—a scheme which will involve (so to speak) tremendous departmental machinery, which will also be costly. All this must be a charge on electricity; and, therefore, it may be expected that energy will not be retailed at any cheaper rates than the existing generators are able to provide it for. It would, however, be very short-sighted on the part of the gas industry to adopt any such view. No one can tell what will happen to the Bill, nor the character of the electrical developments that will result from it. The Bill will unquestionably meet with a vast amount of opposition; and it may be changed in certain particulars. But the Government are resolved to carry through the Bill in some form. On all grounds, therefore, it is better to over than under assess its importance from the standpoint of the gas industry.

It will be observed that the Bill follows very much on the lines of the Board of Trade Electric Power Committee's report in respect of the appointment of Commissioners and District Boards, with their staffs of officials and so forth. It provides for loans from the Treasury to the extent of 20 millions sterling for expenditure in the next two years; and for the issue of stock to the amount of 25 millions by the Electricity Commissioners—together 45 millions. Electricity generation will thus have an important advantage in capital raising as compared with other industrial concerns; and there is no information yet as to the interest terms on which the money will be lent. The assistance will anyway in these times be very valuable. If the Bill passes as it stands, all the protests and the hopes of the municipal suppliers of electricity will simply be discarded and annihilated. They are not to be the sole controlling members of the District Boards; and the District Boards are to strip them of their generating-stations, unless the Boards require them to manage the plants for a time on their behalf. The charges of the District Boards to the electricity purveyors are to be regulated so that they cover expenditure. This is satisfactory. The Commissioners are also to be given powers to regulate the prices charged by distributors, so that the consumers obtain the benefit of any reduction of the costs of production. This interference will not be to the liking of the local distributors. Anyway, under the new conditions, there ought to be no profit-making in aid of the rates, and there should be no losses to be liquidated by the general body of ratepayers. The long-sought powers (so often rejected by Parliament) enabling hiring-out of electrical fittings and apparatus by local authorities supplying electricity are included in the Bill; so there should be satisfaction at least by local authorities over this point, if those who are antagonistic are not again successful either in securing the rejection of the clause, or in making it compulsory upon electricity undertakings to ensure that the hiring-out business is self-supporting. The gratification of the electricity industry over being dropped out of the Ways and Communications Bill will be damped by the clause at the end of the Bill which proposes to transfer all the electricity powers

from the Board of Trade to the new Ministry; so that, after all, the Government have no idea of departing from their original intention of attaching electricity to the tail of transport. As the Bill stands, it looks as though the District Boards will be able to take-over the supply of electrical energy to local tramways and other electrical means of locomotion.

Co-Operation—Checked or Courted?

THE country has first claim on all our services; and the claims upon the services of Lord Moulton at the Peace Conference resulted in the cutting-out of the central feature in the arrangements for the meeting last Wednesday of the Society of British Gas Industries. But no one complains; the country has, and must have, first call upon Lord Moulton. Besides which the Council of the Society are resourceful; and Sir Dugald Clerk, Mr. Balfour Browne, K.C., and the new President (Sir Arthur Duckham) were present, and they filled up the breach by speaking upon several matters which have large contemporary interest. There are some folks misinformed, or whose imagination has withered, or who cannot understand that we are living in new times and with new methods, who seem to think that the Society of British Gas Industries represents a kind of annexe to the main fabric called the gas industry. At the luncheon, the Hon. Secretary of the Institution of Gas Engineers (Mr. W. E. Price)—it may have been merely the manner of expression—fell into the error of speaking of the members of the Society as though they were a body separate and distinct from the gas industry. The members know that they are an integral part of the industry—a part without the brains, the initiative, the enterprise of which the industry could not very well get along, and without which it is in fact incomplete. If anybody has a desire to argue the contrary with Sir Arthur Duckham, Sir Dugald Clerk, Mr. Archibald P. Main (the late Chairman of the Council of the Society), Mr. Samuel Glover (the President of the Institution of Gas Engineers), or with the members of the Council of the Society, he will be wise if he first reads through the reports of their various speeches at the meeting of the Society, in order to ascertain the probable measure of the security of his position.

Personally we cannot see, and never yet have been able to see, why the Society should have been denied the full privileges of any other section of the industry. The Council in their report regretted the exclusion of the Society from the National Gas Council; while throughout the industry, in these days when our work is being remodelled and services extended, there rings the word "Co-operation." We like to think of the word in its fullest, comprehensive sense—co-operation of every element, and co-operation in every direction. While the National Gas Council shakes hands with the Society on the doorstep, but does not invite it inside, the Board of Fuel Research recognize that there must be co-operation between the suppliers of gas and the manufacturers of gas appliances under the new order of things which they advise the Government to adopt, and which is so largely and radically essential to the progress and prosperity of the industry. And if ever there was a time when the most intimate co-operation was desirable, that time is now, when economical gas production claims the provision of appliances of the utmost efficiency under the new circumstances. The work in the one direction is inseparable from that in the other. Benefits do not flow from the gas-supply industry to the manufacturers only; substantial and valuable benefits flow from the manufacturers to the gas-supply industry. Yet the Society have as yet no recognized place in the National Gas Council! There may be a Committee, according to plan, considering the matter; but there are as yet no indications as to what, if anything, is actually being done. The allusions in the annual report of the Council of the Society to its exclusion from the chief organization, are dignified and hopeful. For the gas industry, these are critical days; and to it the work now being done is of vital importance. What is wanted now, says Sir Arthur Duckham, is to bring the knowledge and the ability that everyone possesses to the benefit of all. Is this to be accomplished by exclusion or by association?

German Treatment of British Gas Enterprise.

The record of the war-time history of the Imperial Continental Gas Association had an important supplement made to it by the Chairman (Sir Charles Jessel, Bart.) at the meeting of the proprietors last Tuesday. Those of our readers who desire to learn something more than they already know as to the German standard of morality in dealing with a commercial undertaking with large properties in their country, and with honourable business connections extending over best part of a century, will find it in the story that Sir Charles had to tell. If there is one country in the whole world with which the Association does not desire to renew connections, or enter into fresh engagements, it is Germany. This means much when applied to an undertaking that had invested so heavily in Germany, and that had done so much for that country in times past. The experiences of the Association in Germany should be a warning to others. The financial situation of the concern, so far as the property in Germany goes, is a feature of the report appearing in our news columns.

The New "Eagle" Gas-Range.

The reference made in these notes last week to the criticisms of the oven of the new "Eagle" gas-range has brought from Messrs. John Wright & Co. a letter for our "Correspondence" columns to-day. The critics will there see that the firm, as we expected would be the case, have answers to the points raised. Ultimate proof of the benefit of new ideas and inventions rests in experience; and evidently the firm are confident that experience will give the new range a good place in popularity, on the grounds of great economy in fuel and efficiency in operation and result.

Predominant Heat.

In talking of their electrical power schemes the Government and electrical engineers, and consequently the lay Press, overlook the fact that heat has a predominant use over power, in that heat is required in every house and every industry, and plenty of it. If anything, the Government should, in the first place, have legislated in connection with the conservation of coal and the industry that best provides from coal the heat requirements of the country, and simultaneously ministers to the needs of the nation in the matters of cheap lighting and power, while obtaining and preserving many materials that are basic to the life of other industries. After legislation in this direction had materialized, then the electrical problem could have been tackled. This would have been the proper order of things. But it seems to have been no body's business to point this out to the Government. Sir Dugald Clerk drew attention to the importance of the heat question in one of his speeches at the Society of British Gas Industries last Wednesday; and he also pointed out that, from statistics received from America, it appears that only from 3 to 6 p.ct. of the costs of industrial operations represents power.

Patent Extensions at a Price.

Many inventions have been lying dormant owing to the war, and inventors have, in consequence, suffered much loss through the nearly five years which have lapsed through no fault of their own. The matter was raised by Mr. C. F. Tilley at the private Council meeting of the Society of British Gas Industries; and it was introduced to the notice of the members at the afternoon sitting by the Chairman (Mr. Archibald P. Main). It seems that the Government have seen the force of representations made to them, and are allowing an extension of five years, providing the renewal fees for the period are paid. This is a clear injustice, as Mr. Balfour Browne, K.C., says. The sum involved may not be a large one per patent; but there is something about having to pay for the dormant period that does not appear to be quite honest. Ever since the war started, the Government have not lost an opportunity of getting a picking out of industry; so this move of theirs is in a piece with the rest. Inventors have ground for remonstrating; and they are doing so. It is no fault of theirs that their patents have been unproductive during the war. Sir Dugald Clerk, however, seems inclined to advise that it is better to be content with the concession of the time extension, and not to make a fuss about the fee which the extension entails. This may be sound advice; but it rankles with Britishers to feel that they have been "done," and more so when it is by compulsion, and not by their own carelessness or folly.

Insurance Companies and Employers' Liability.

Another point raised on the same occasion, which points to insurance companies being war profiteers, is this: During the war, wages of workmen have risen from (say) £2 to between £4 and £5. The insurance premiums for employers' liability in connec-

tion with accidents have therefore gone up about 100 p.ct.; but the insurance offices have only raised the amounts of compensation paid for injury received by 25 p.ct. No doubt the costs of salaries and wages and general expenses have advanced for insurance companies as well as in other businesses; but certainly the difference between the two percentages does not speak of equity. This is a matter that should be inquired into in the House of Commons. Perhaps the Society could take steps to approach Sir Fortescue Flannery or Sir Hallewell Rogers to put a question on the subject in the proper quarter.

MR. EDWARD. J. FOTTRELL, B.Sc.

Photo by Burow, Chiswick.

The Newly-Appointed Manager of the National Gas Council.

INSTITUTION MEETING PROGRAMME.

May 27, 28, and 29.

The Annual General Meeting of the Institution of Gas Engineers will be held at the Institution of Civil Engineers, Great George Street, S.W., on Tuesday, Wednesday, and Thursday, May 27, 28, and 29—under the presidency of Mr. Samuel Glover, M.Inst.C.E., of St. Helens. The chair will be taken at 10.30 on Tuesday, and at 10 o'clock on Wednesday and Thursday.

On Tuesday there will be the address of the President, the presentation of the annual report and accounts, and the report of the Gas Investigation Committee. The members will meet again in the evening at a reception and dance, by invitation of the President and Mrs. Glover, at the Royal Institute of Painters in Watêr Colours, Piccadilly.

After the annual meeting of the Benevolent Fund on Wednesday, Prof. Arthur Smithells, C.M.G., will open a discussion on the "Education of a Gas Engineer," which will be followed by the report of the Refractory Materials Research Committee, to be presented by the Chairman (Mr. A. E Broadberry), the report of the Life of Gas-Meters Research Committee, on the "Internal Corrosion of Mains and Services," by Mr. J. G. Taplay and Mr. B. R. Parkinson, and a paper on the "Application of Reinforced Concrete to Purifier Construction," by Mr. A. E. Broadberry.

On the concluding day, the formal business will be preceded by papers on the "Inter-relation of the Gas and Dye Industries," by Dr. W. B. Davidson, of Huddersfield, and on "Some War Experiences of British Gas Undertakings," by Mr. H. Townsend, of Wakefield. There will also be replies to Question Papers.

Gas for Developing Energy.—In the course of a lecture delivered in London, on "Britain's Underground Resources for the Future," Dr. W. T. Gordon said that much had been heard lately about the employment of coal for the development of electrical energy; but in its use for this purpose there was a tremendous loss of energy, not only in developing the power, but owing to leakage. It was an inefficient way of using our coal supply. A much more economical method was to use gas. This was a material which could be generated comparatively easily, without much loss; and the methods of employing gas were becoming more efficient than they used to be. Gas was more dangerous than electricity in certain industries, and for certain definite purposes electrical power might be better; but, other things being equal, gas was a much cheaper way of developing energy.

BRITISH GASLIGHT COMPANY'S STAFF CHANGES.

Mr. John Young's Retirement.

We regret to learn that Mr. John Young, the Engineer and Manager of the Hull undertaking of the British Gaslight Company, Ltd., is about retiring from active service. He has felt very severely the strain of the conditions existing during the war; and, his health having suffered in consequence, he has asked the Directors to relieve him of his responsibilities by allowing him to sever his connection with the Company. It has been noticed for some time past that Mr. Young has not been in his usual robust state of health; and a year ago his doctor insisted on his taking a short rest. The Directors have accepted Mr. Young's resignation with sympathy and regret, and have granted him a retiring allowance. Their hope that his well-earned rest may be the means of restoring his health will be shared by his brother officers, the several staffs of the Company, and his numerous friends throughout the gas industry.

Mr. Young has been thirty-eight years in the Company's service, the last thirty-four years of which have been continuous. For twelve years he was in charge of the Staffordshire Potteries station; he was next appointed Engineer and Manager at the Norwich station, where he remained for four years; and he was then promoted to the Hull station, where he has been in charge for eighteen years.

Mr. Thomas Glover, of Norwich, who now becomes the Company's Senior Engineer, was offered the position rendered vacant by Mr. Young's retirement; but he felt that he could not leave Norwich, having regard to the important alterations being carried on there, of which he has prepared the designs. The Directors have agreed with his views; and Mr. H. E. Copp, the Engineer and Manager of the Company's Staffordshire Potteries station, will therefore succeed Mr. Young, and will shortly take over the control of affairs at Hull.

BOARD OF FUEL RESEARCH.

Memorandum by the Institution Council before the Issue of the Board's Report.

Prior to the issue of the report of the Board of Fuel Research, a draft copy was considered by the Council of the Institution of Gas Engineers; and they also discussed the matter with the Gas Investigation Committee. As a result, a memorandum was prepared by the Council, which was incorporated in a communication which the National Gas Council made to the Board of Trade.

In the report, it was submitted (Clause 8) that "it would be idle to pretend that consumers generally are satisfied with the results of the alterations in standards which had begun to come into operation before the war." The memorandum contests this. The industry knows of no good ground for the statement that consumers generally were dissatisfied with the result of the alterations in standards which had begun to come into operation before the war. Any alterations made were accompanied by financial advantages to the consumer that more than counterbalanced any depreciation in calorific value. The gas industry submits that the pre-war changes in gas standards were to the advantage of the consumer, who gave evidence of no dissatisfaction therewith.

Regarding Clauses 11 to 13 of the report, it was held in the memorandum that the operation of the sliding-scale modified to meet the altered value of the pound sterling should effectively secure co-partnership between consumer and producer.

On the point as to the change of the basis of charging to heat units, it was submitted in the memoranda that it is felt by the great majority of gas undertakings that there are serious practical difficulties entailed in changing the methods of charging for gas from per 1000 c.ft. to per 10,000 B.Th.U. It was suggested that the object desired could be attained easily by adjustment of the sliding-scale or maximum price according to the declared minimum calorific value of the gas supplied, and the requirement of a declaration of the calorific value on all accounts rendered. There are, it was contended, so many advantages to be gained by adherence to the present method of charge, that "it is greatly to be hoped that the report will be modified in the direction indicated. The gas industry, however, sees no objection to an option to charge by heat units being given to undertakings which desire so to do." [The matter of the suggested change is dealt with in an editorial article this week commenting upon Mr. Canning's paper before the Welsh Institution.]

Among other points is that, while the proper adjustment of consumers' appliances is of the greatest importance, objection was taken to the statement that the burners and other appliances in which "war gas" had to be burned were "wholly unsuited for its safe and efficient consumption." This is diametrically opposed to the experience of the industry generally. It should be sufficient to place on the producers the responsibility for the adjustment and, if necessary, replacement of consumers' fittings. Gas undertakings (which are subject to severe competition) have such regard both to their statutory obligations and to their own business interests (which are based on the satisfaction of the consumer) that it is unnecessary to set up a costly staff of official inspectors, who

might be the cause of friction and dispute between producers and consumers rather than of assistance to the latter. It is fully agreed that the quality of gas supplied should be the subject of periodical examination by duly qualified examiners.

As to the suggested limitation of "inerts" to a maximum of 12 p.ct., this would inflict on consumer and producer alike a financial disadvantage entirely unwarranted by any practical advantage to the consumer, and would completely negative the freedom as to methods of manufacture which the report otherwise seeks to bestow, and be absolutely contrary to the policy laid down in Clause 48. Numberless practical tests have failed to disclose any difference in value to the consumer of gases of equal calorific value, but of varying percentage of "inerts" up to as high as 30 p.ct. It is strongly urged in the memorandum that the limitation of the percentage of "inerts" should not be placed at any less figure than 20 p.ct.

In order to meet the suggestions contained in Clauses 40 to 48 of the report, it was submitted in the memorandum that powers should be given to gas undertakings to supply by agreement with consumers gas of any quality at any pressure, and on any terms that may be agreed, subject to provisions to ensure that there shall be no preferential charge as between any consumers who take supplies of special quality gas under similar conditions and circumstances.

Conclusions and Recommendations.

The memorandum submitted that these should be revised to read somewhat as follows:

1. The gas undertaking to declare, and to state upon all accounts rendered, the standard minimum calorific value of the gas they intend to deliver and to undertake to adjust the consumers' appliances for the ordinary purposes of domestic lighting, heating, and cooking, so that the gas delivered can be burned in those appliances with safety and efficiency.
2. Should the gas undertaking desire at any time to change the standard minimum calorific value of the gas supply, notice to be given to consumers or their representatives *months before the change is to come into effect*. During the period of notice, preparations to be made by the gas undertaking for any readjustment of the consumers' appliances which may be required to ensure safety and efficiency in the use of the new supply. [In this clause of the report, the word "due" has been inserted before the word "notice;" and the italicized words have been omitted.]
3. The calorific value supplied to be ascertained by the usual test in the gas calorimeter, subject to any modification which may be agreed on in the mutual interest of consumers and producers and sanctioned by the Board of Trade.
4. The standard or maximum price to be varied from time to time according to the declared standard minimum calorific value of the gas supplied.
5. Subject to the foregoing conditions, the gas undertaking to be free to deliver to the consumer any mixture of the ordinary combustible gases not containing more than 20 p.ct. of inert constituents; provided that nothing in this clause shall prevent the supply by any undertaking of gas of quality different from the standard minimum calorific value on special terms under agreement and subject to an equality clause.
6. The gas undertaking to maintain a pressure of not less than 15-10ths of an inch of water pressure on the gas in the undertaking's pipes up to the point where they enter the consumer's premises; such pressure to be ascertained by gauge at the nearest convenient point on the undertaking's pipes. [It was submitted that 2 in. is too high for a penal minimum limit.]

THE ELECTRICITY BILL.

National Electricity Generation.

In the House of Commons last Thursday, without any fuss, the Home Secretary (Mr. Shortt), supported by Sir Eric Geddes, Mr. Munro, Mr. Macpherson, Sir Hamar Greenwood, and the Attorney-General, submitted the long-expected Electricity Bill, which, as the outcome of the Board of Trade Electrical Power Committee's report, it is proposed shall make a radical alteration in the law relating to the supply of electricity. The Bill was down for second reading yesterday.

Electricity Commissioners and their Retinue.

In the main, the Bill (which occupies twenty-seven pages) runs very much on the lines of the Power Committee's report. The clauses contemplate the appointment of five Electricity Commissioners, with a Secretary, and a retinue of inspectors, officers, and servants, and provide for salaries and remuneration, and retirement pensions and gratuities. The Board of Trade preserve their rights to exercise, through the Commissioners, their powers under the Acts relating to electricity, which rights will (as the final paragraph of this review shows) be eventually transferred to the Ministry of Ways and Communications, if the clause to give effect to this passes. The machinery seems to be somewhat extensive, and is not of that simple nature that the Chairman of Committees of the Ministry of Reconstruction recommended. Their views appear to have been entirely bye-passed. The Commissioners may also appoint an Advisory Committee consisting of a Chairman and other members of District Electricity Boards; and they are to be empowered to carry out experiments and trials.

Districts and the Constitution of the Boards.

As a preliminary to the creation (by Special Orders) of districts for the purposes of the Bill, the Electricity Commissions are to hold local inquiries; and, this being done, they may then constitute and incorporate for each district a District Electricity Board. In the grouping of the districts, efficiency and economy in the supply of electricity are to be taken into account. There is to be included as members of each Board representatives of local authorities, companies, and persons who are electricity undertakers, as well as large consumers, and labour. This is interesting. It shows that the Board of Trade have ignored the plea of some municipalities that companies and all others but themselves shall be denied participation in the work; and the special mention of labour indicates that the Government have bowed to the democratic spirit of the age, and are going to invite labour to take part in the control of the national scheme of electricity generation. Power is given to pay remuneration for services out of the revenue of the District Boards to "all or any of the members." The administrative machinery is evidently going to cost the patrons of electricity something.

A Monopoly of Generation.

According to the Bill, the District Boards are to secure the provision of a "cheap and abundant" supply of electricity within their district. What, one asks, is "cheap" electricity, and what is an "abundant" supply? The Bill does not define either term. The task to provide "cheap" electricity is not so simple now as it would have been before the war, with constructional costs and machinery up more than 100 p.ct., and the cost of labour, fuel, and materials generally what they are. However, it is to be the "duty" of the Boards to provide the cheap electricity, and for this purpose they are to have powers and duties with respect to: (1) The acquisition of generating stations; (2) the acquisition or user of main transmission lines of any authorized undertakers; (3) the supply of electricity within their district (including the construction of generating stations, main transmission lines, and other works required for the purpose); (4) the acquisition of the undertakings, or parts of the undertakings, of authorized distributors and power companies. There is no question about the District Boards absorbing all electricity generation for public purposes (other than private plants) unless a station is inconveniently small or inconveniently situated. Thus—

> As from the date or dates as may be specified in the Order constituting a District Electricity Board, all generating-stations then existing within the district other than private generating stations, and such main transmission lines as may be specified in the Order, shall, by virtue of this Act, vest in the District Electricity Board subject to the payment by the Board to the owners thereof of the standard price, but freed and discharged from all mortgages and other charges to which the same may be subject; and the proviso to Section 78 of the Schedule to the Electric Lighting (Clauses) Act shall apply as if the generating stations or main transmission lines had been sold under Section 2 of the Electric Lighting Act, 1888.
>
> Provided that in any case where, on the application of the District Electricity Board, it is proved to the satisfaction of the Electricity Commissioners that any particular generating-station is so small, or so situated or equipped that it could not conveniently be used for the purposes of the undertaking of the District Electricity Board, the Electricity Commissioners may, after giving the owner of the generating-station an opportunity of being heard, by order exempt the District Electricity Board for such period as may be specified in the Order, from the obligation of acquiring the generating-station.

The Price to be Paid.

We can see ground provided here on which there will be many encounters with the present owners. The "standard price" is described as one or more annuities of such amount or amounts, and continuing for such period or periods, as an auditor appointed by the Electricity Commissioners certifies to be required to indemnify the local authority against their liabilities for interest and sinking-fund charges in respect of such sums borrowed for the purpose of providing the generating-station or transmission line as are at the date of the transfer outstanding. If part of the cost has been defrayed out of revenue, the annuity may be increased by such an amount as the Electricity Commissioners think just. If the property belongs to a company or person, then the standard price will be such sum as may be certified by an auditor appointed by the Electricity Commissioners to be the cost of, and incidental to, the construction of a generating-station or transmission line, and the acquisition of the site, less depreciation. In exceptional cases where injustice would be done, the Board of Trade may appoint an arbitrator to settle the question.

The Price of Electricity to Present Owners.

An obligation is imposed upon the District Electricity Board to supply those from whom plant is taken, with electricity not less in amount than could have been generated by them, and at a price not greater that that at which it could have been generated by their own plant. In determining the price, regard is to be had to capital charges, costs of fuel and labour, and other costs. The District Boards may also enter into agreement with the former owners of generating stations for them to work and maintain the plant for such period and on such terms as may be resolved on.

Powers to the District Boards to Supply Electricity.

Room for further disagreement is found in the clauses which propose that a District Electricity Board shall have power to

supply electricity subject to limitations. The Board may not supply electricity in any area which, for the time being, forms part of the area of supply of any authorized distributors without their consent, except to lighting authorities, or to railway, tramway, canal, or inland navigation companies or authorities for the purpose of traction or haulage, or for lighting vehicles and vessels for the haulage of which electricity is supplied. We see here the hand of the Ministry of Ways and Communications, and consequently trouble. The Boards are to be precluded from supplying in any part of the area of supply of a power company for any purpose for which the company are authorized to supply, without the consent of the company. If consent in any case is unreasonably withheld there is to be appeal to the Electricity Commissioners, upon whose recommendation the Board of Trade may dispense with the consent. Power is confided to the Electricity Commissioners to determine the price at which the District Boards are to supply.

Miscellaneous.

Authorization, it is proposed, is to be given to the Electricity Commissioners to exclude from the area of supply of a power company any part of the area which, at the time of the application, is not being supplied by the company, and which could be better served by the Board. It is intended to keep present distributors up to the mark in affording facilities for obtaining electricity; otherwise they may find the whole of their business vested in the District Board by the action of the Commissioners. Powers as to water supply and the utilization of waste heat are to be conferred. Provision is made for compensation to "any officer or servant" who suffers loss of employment; in the case of dispute reference being made to a referee to be appointed by the Minister of Labour. Before incurring capital expenditure, District Boards are to submit details, plans, and estimates to the Commissioners. Power is also to be given to existing undertakings to render mutual assistance. Overhead wires and wayleaves have clauses devoted to them.

Help from the Treasury.

For two years after the establishment of a District Board, the Board of Trade, in consultation with the Commissioners, may construct "interim works." For such works, the Treasury, it is intended, may provide out of the Consolidated Fund £20,000,000, on such terms as they may think fit. Provision is made for the vesting of such works in the District Boards, and for the repayment of the advances. The powers of the authorities who at present sanction borrowings by local authorities for electricity purposes are to be transferred to the Commissioners.

Hiring-out Apparatus.

A general hiring-out power for electricity-consuming apparatus and fittings—long sought for by local authority electricity undertakings, and often rejected by Parliament—is included.

Regulation of Profits.

The prices to be charged by a District Electricity Board are to be subject to the approval of the Commissioners, and are to be such that their receipts on income account will be sufficient to cover their expenditure (including interest and sinking fund charges), with such margin as the Commissioners may allow.

The Commissioners may also regulate the prices of authorized undertakers, "with a view to securing that the benefit of any reduction in the cost of electricity, or in the capital employed in the production thereof, attributable to the provisions of the Act, shall inure to the consumers."

Other Financial Provisions.

Powers to borrow and issue stock are to be conferred upon the Boards; and authorized undertakers in the area of supply may render financial assistance by lending money, subscribing for securities, guaranteeing the payment of interest borrowed, or by rendering financial assistance in any other form. Later on it is seen that the Electricity Commissioners are to be authorized, with the approval of the Treasury, to lend to the District Boards or authorized undertakers any money not exceeding in the aggregate £25,000,000. This will come from a fund to be called the Electricity Loans Fund, for the purposes of which the Commissioners may issue stock. For five years the expenses of the Commissioners are to be paid by Parliament; but the money will be treated as advances, and will be repaid with interest in the next succeeding three years.

Transfer to Ministry of Ways and Communications.

As we anticipated would be the case, though the electricity industry did not want it to happen, provision is made for the transfer of all the duties and powers of the Board of Trade under this measure and the Electric Lighting Acts to the Minister of Ways and Communications, in the event of the Ministry being established.

Last Wednesday, the members of the "S.B.G.I." Golfing Society dined together at the Hotel Russell, at the invitation of the new Chairman, Mr. Samuel Cutler, jun.; and, on the following day, the members met at the Purley Downs Golf Course for the annual competition for the "Yates" Challenge Cup. The winner of the trophy on this occasion was Mr. G. H. Perry (Messrs. Mobberley and Perry); the next best score being that of Mr. H. M. Thornton. As usual, the meeting was highly successful; and members who were present report a very enjoyable day. We understand Mr. Cyril G. Davis was voluntarily responsible for all arrangements in connection with the meeting.

ELECTRICITY SUPPLY MEMORANDA.

The effects of the cessation of munitions work upon electricity supply undertakings that have been visited by a large ephemeral demand for power purposes have been alluded to before in the "Memoranda." It has been shown how the heavy drop in demand has played havoc with last year's municipal estimates; and, of course, the uncertainties as to the future make an estimate for the current year a matter of an extremely indefinite nature. There was during the power peak load a very positive view in some quarters of the electricity industry that electric power had been proved to be such an indispensable thing for industry that there would be comparatively little effect upon consumption by the passing from war to peace conditions—electricity being electrically considered the one thing necessary to the great revival of peace manufactures and trade. It has been a rude shock to some electrical men to find that there are other things that count, and that manufacturers do not even mention electricity, or any other form of power, when they are speaking of the future, of business development, and of employment. They leave the power problem (keeping private their own individual views on the subject) for politicians and electrical men to talk about; and a nice mess they have made of it in every direction.

High-Pitched Expectations.

Gains Swamped, and a Nebulous Future.

In the "Journal" for March 18 [p. 566], it was shown how the conclusion of the war upset the calculations and results of the Manchester Corporation Electricity Department to such extent that it was necessary to give the charges to consumers another sharp jerk upwards. Further information is to hand as to the Manchester experience. It is learned that, up to Armistice Day, the output continued to grow satisfactorily; but from that time to the close of the financial year the loss swamped all previous gains. This was remarkably quick and significant work. It certifies the fortuitous character of the great accession of demand—a demand due solely to convenience for particular work. What is more, the total sale of the last financial year was less than that for 1917-18. The financial result was a loss for the Manchester Department for the year of £37,890, which brings to notice a piece of unsound finance of which the Corporation of such an industrial and commercial city ought to be downright ashamed. The loss would actually only have been between £4000 and £5000, had not the Department had to pay £33,255 in aid of the rates. This alone is wrong; but it is worse when we see that to liquidate partially the £37,890, the small reserve fund of £23,636 has been swallowed up, and there is then a balance loss of £14,254. Provision for liquidating this loss has been made by increasing the consumers' charges, which have also been put up high enough, it is hoped, to ensure £29,746 being made to go in aid of the rates. Had it not been for the appropriation last year, and the sum ear-marked for the present one, the Department could, the figures lead us to think, have gone along quite comfortably without the last increase in price. Still, with this increase, the Electricity Supply Committee are looking upon the future with a great deal of apprehension. There is stagnation of trade; there are difficulties as to costs of materials and labour, and the troubles of transport. The position for industry is completely overcast. Estimates have no dependably sound basis. What is reckoned may occur in financial result for the current year may be far out of what will be the reality of the situation next March. And the indication of the doubtfulness of the position is seen by the continued increases in prices charged for current in almost every part of the country. Brighton, it may be observed, is asking to advance its maximum price from 7d. to 8d. per unit; and Brighton caters largely for residential and shop lighting. Maidstone is applying for power to raise the maximum price from 7d. to 10d. per unit. These are signs of what some electrical men have in mind as to the immediate prospects of their trading situation.

Piling Up Capital Expenditure.

Naturally, the electricity industry must carry-on; and with over-worked plant, and maintenance and repairs in arrear, it cannot go on indefinitely waiting for bulk supply to turn up from a national scheme. The Board of Trade Power Supply Bill has now been introduced into Parliament. Reference to it is made in our editorial columns; and a summary of the contents of the Bill will be found on p. 357. It is not likely the Bill will be rushed through with the speed of an emergency measure; and we rather think the electricity industry itself is not so keenly anxious that this should now be done. It wants to examine thoroughly the actual intentions of the Government in the matter of the form of administrative control it is intended to place on the industry. Already some painful shocks have been received by it as the plans of the Government have been unfolded, supplemented by the divergent advice of Committees and other authorities. What was thought at one time would be a good thing is not looked upon with so much favour now. After the Bill becomes an Act, there will be the machinery to get in order, plans to be formulated, endorsement given, and constructional work to be undertaken. The time required for all this is an "x" quantity. So the

electricity supply industry cannot wait; and many of the undertakings are desirous of piling-up their capital expenditure on extensions and new work, not a small part relating to generating plant. Some instances of this have from time to time appeared in the "Memoranda;" and last week again we noticed that for electricity supply Bury is anxious to borrow £94,000, Croydon £122,000, Dundee £250,000, Grimsby £118,000, and Southport £132,000. Hull is also contemplating estimates amounting to £123,721. These are only a few instances among many.

Interlinking and Consolidation.

Lately there has not been much heard of the linking-up of undertakings. But there has been a good deal of it going on; and the reports as to the benefits that accrue are of a very satisfactory nature. The London undertakings have largely gone in for this mutual help method. The Poplar concern is linked-up with Stepney; and the stations close-down alternately during light-load periods. Poplar reports that the saving to them equals 4½ p.ct.; which is equivalent to £2160 per annum. This is a saving that is not to be sneezed at in these times. There are inquiries afloat as to a large joint scheme of electricity supply for the North-East of London. The West Ham and the Poplar Borough Councils have appointed a Consulting Engineer to make investigation; and a preliminary report has been submitted by him. The various Councils concerned have been invited to consider this report. But in most parts of the country, the municipal authorities are all desirous of being predominant in their own areas and a substantial amount of territory around. Their desires will be subject to those of the Government. What, however, is hoped by some of them is reflected by a remark in a recent lecture by Mr. W. W. Lackie, the Chief Engineer and Manager of the Glasgow Corporation Electricity Department. It was: "The conditions of transfer of existing municipal undertakings, if they were transferred, would require careful scrutiny; and the clause in the Electric Power Supply Committee's report which stated that 'exceptional cases may require special treatment' should be applied to such an undertaking as that of the Glasgow Corporation, otherwise serious wrong would be done to the electricity and tramways departments."

Laggard Electric Meters.

Talking with an electrical engineer not long since, he described the electric-meter as the most offensively stupid thing with which he had to deal; and he asserted that he would not like to have to swear to the veracity of the meters that he has on his district. The fact that there is no compulsion to have them tested, stamped, and sealed is eloquent as to their character of being simply pretenders as a means of fair measurement as between supplier and supplied. If there was compulsion to have the wayward instruments tested, stamped, and sealed when new, and before being installed, this would be no guarantee as to their continued good behaviour. The losses between electricity generation stations and the points of use in the consumers' premises are heavy; and there is little doubt that this is partly due to the inefficiency of the means of measurement. The "Electrical Review" does not hide these facts. It confirms them; and it has admonished its technical readers to watch their meters, and to make them as punctilious as possible in the observance of their duty, because every unit not metered is a positive loss to the electrical undertaking. The tendency of electric meters is to go slow; and there is a very general disinclination to start on a low load—in fact, "it is a most common fault for meters not to start on one lamp; and this with thousands of consumers would become in the course of a year quite a serious matter." What is worse is that this fault operates on the high-priced units. Our contemporary instances one large London undertaking, which, though developing rapidly, found there was not a proportionate advance in the revenue. With the overhauling and adjustment of the meters, extra revenue was brought in. The meters, in this concern, are also changed approximately every three years. In small undertakings the disposition is to let the meters go on indefinitely; and a case is mentioned in which the meters were allowed to go so far wrong as to attract attention through a noticeable and wholesale falling-off in the revenue. The gas industry hopes that the electricity industry will heed the good counsel of the "Review." Perhaps then we shall have some explanation of that little piece of pleasantry of electricians which declares that, taking a certain number of B.Th.U., the tested results of the efficiencies of electrical apparatus, and a given charge per unit, an amount of work is done by the electricity consumer in excess of what these factors permit. In other words, one cannot expend more heat energy than is placed at disposal by the units alleged to have been used, discounted by proved efficiencies. Perhaps the meters provide an explanation; and some of the B.Th.U. actually utilized find their home in that large and flexible electrical item—unaccounted-for energy.

Box Rooms and the Housing Schemes.

One thing that the gas industry hopes to be able to accomplish in connection with the housing schemes is to help in the provision of more space in rooms by doing away with spacious chimneys and chimney breasts; gas fires and other apparatus being quite content with simple flues in the brickwork. We see that "Meteor" of the "Electrical Times" is hoping that electricity may be used, so that the rooms in the homes of working men may be more box-like than ever. He says that, by the use of the electric light, it will be possible to reduce building costs by diminishing the height of rooms to 8 ft. or 8 ft. 6 in. The working man has no intention of committing himself, wife, and family to the prescriptions of "Meteor," for the benefit of the electrical industry. His views have grown, and not diminished. This applies to houses as well as to wages.

Death-Yielding Voltages.

We have not for some time past been noting the fatalities electrically caused; but this is not because there have not been any. They continue to be recorded in other quarters from week to week. There have recently been cases at quite normal voltages. There was a labourer, named John Robertson, who, at the Hill Crest Oil-Works, Clayton, just recently died through a shock from a portable electric-lamp. The voltage was only 240. While fixing an electric cable at a house in Bethnal Green, Thomas Carter, employed by the Stepney Borough Council, was killed through touching a cable. Clarence Oxley, an employee of the Appleby Iron Company, was lately found dead grasping an electric wire (220 to 250 volts), which had been fixed 25 ft. from the ground, but had broken and fallen. These are ordinary voltages, and samples of a danger against which people should be fully warned.

SOME ASPECTS OF THE FUEL RESEARCH BOARD REPORT.

By "ENGINEER."

IN the "Editorial Notes" in the "JOURNAL" recently the report of the Fuel Research Board was rightly referred to as a new charter for the gas industry. In giving it a welcome, however, we must not regard it as more than it is—viz., the door to freedom, and should bear in mind that this freedom carries with it moral and material obligations. Further, it must not be forgotten that the report is primarily drawn up in the interests of the consumers; and whatever benefits accrue to the gas industry will owe their existence to the fact that in most things, the interests of the consumer and the industry are collateral. We shall make a great mistake if we look upon the report, in itself, as conferring any financial advantage upon the shareholders, unless unaccompanied by generous parliamentary treatment in the adjustment of standard prices owing to the altered conditions due to the war.

There is much food for thought, and material for discussion, in attempting a forecast of the manner in which the report will be made operative. It may happen that a General Act will be passed abolishing all existing clauses relating to candle-power and calorific values, in existing General Acts as well as in Private Acts. The General Act may specify the standard gas of the country as (say) 500 B.Th.U. gross, or alternatively defining a unit of so many B.Th.U. on the lines of Dr. Carpenter's suggestions. The Act might well embody a final scientific definition of a British thermal unit, limitations regarding instruments of testing, and rules and conditions affecting the periods of testing, the position of the test stations, and the adjustments for temperature and barometric pressure; also the methods of calculating the averages for quarterly accounts, and the method of procedure in the event of any serious differences between the district and the works tests. It would be well to standardize the whole of the country in all these matters.

It would then be necessary to fix for each undertaking a standard price per unit or per 1000 c.ft. of the standard gas; and here the National Gas Council should lead the way. The Council should use all their endeavours to avoid the cumbrous machinery of the Parliamentary Committee Rooms, and get it established that the standard price is to be based on post-war conditions. This price should be fixed as in the old days—viz., having regard to the size, geographical position, and general conditions of each individual company or corporation, but by responsible officials of the Board of Trade or Local Government Board respectively, with technical assistance if necessary. Comparatively few officials, if responsible and efficient, could in a very short time deal with the whole country.

In the writer's opinion, the National Gas Council should make this the most pressing of their duties—*i.e.*, the preparation of a comprehensive scheme for putting into early operation the recommendations contained in the report; and they should use every endeavour to ensure its sympathetic consideration in the appropriate quarter, at the same time drawing attention to any features of the report which, in their opinion, require amendment.

Having dealt with this aspect of the subject, we must reverse our previous ideas in the matter of the manufacture, distribution, and sale of gas. Henceforth we must think in B.Th.U.'s, *bearing in mind their relation to quantity*, instead of thinking in the reverse manner. The words in italics are important, for the quantity of gas will be the medium through which B.Th.U's are sold. The gas manager must bear in mind that a very great deal will depend on the bulk of this medium, from his own as well as the consumer's standpoint. He must endeavour to supply such a strength of gas as will enable his consumers to get the best possible economy out of every B.Th.U. (not every cubic foot) consumed; and this must be his first consideration. With suitable adjustments to the consuming appliances, this will give him such a margin to work

on that he must then consider the most economical strength to manufacture, having regard to:

(*a*) The capital cost of manufacturing the plant he may wish to instal.
(*b*) The size and capacity of the plant at the works, and the size of the mains and services.
(*c*) The cost of manufacture.
(*d*) The cost of distribution and selling.

With regard to (*a*), it must be remembered that the quantity of gas manufactured will not be the real criterion; it must be the gross multiple of quantity and of calorific value. Thus a blue water-gas plant is considerably cheaper than any form of retorts for equal quantities; but when quality is taken into acconnt, the difference is not so marked. In dealing with (*b*), very little need be feared in either direction, unless a very drastic change in calorific power is under consideration. In connection with (*c*), the writer would utter a word of warning. It must not be forgotten that during the war period we have been allowed to lower our calorific value without penalty; but in future we shall not be allowed to do so without making a proportionate reduction in price per 1000 c.ft. At the same time, the writer is fully aware that this reduction in power has in nearly all cases prevented a higher increase than would otherwise have taken place. But this does not invalidate the truth of the above remarks.

The point which should be emphasized is that it will not necessarily operate to our advantage to sell a poor gas; in other words, the better gas may give an improved financial result for some undertakings. As a simple example, assume that an undertaking has a standard price of 5s., accompanied by a standard power of 500, or whatever would be the equivalent of this under the new order:

Assume 60 p.ct. of coal gas at 540 B.Th.U., costing 2s. 0d. per 1000 c.ft.						
	40 p.ct. of blue gas at 300	,,	,,	1	0	,, ,,
Result	mixed gas	at 444	,,	,,	1	7 ,, ,,

Thus 5d. per 1000 c.ft. is saved on the mixed gas. But if straight coal gas were sold, there would be a premium on the price, allowing a cost of about 5s. 5d. per 1000 c.ft. (or its equivalent in units); whereas the mixed gas would have to be sold at a discount—at about 4s. 5d. That is, other things being equal, a sacrifice of 1s. per 1000 c.ft. is being made in order to save 5d. at the works.

Of course, other influences affect the question; but this illustration is given in order to show that it will sometimes pay to send out the richer article. One has to consider whether the total cost of making and distributing the lower-grade gas is less in proportion to its reduced calorific value.

With regard to item (*d*), there are again many factors to consider in deciding the policy. If the consumer is well served in all respects, it would appear that the most economical method of distribution would be to sell the most B.Th.U.'s with a given quantity of mains, services, and appliances. In the short example given above, it would certainly entail more expense to sell a million B.Th.U.'s of the low-grade gas than the high grade. In short, it might be found that it would pay to keep up the calorific value, providing the consumer could use it and develop its full power.

There are many interesting points arising on this question of distribution. It has been found that a decrease of 10 p.ct. in calorific value is not always accompanied by a corresponding increase in consumption—due of course to faulty and wasteful burning in the former case. Again, there is the influence of flame temperature, affected by the differences in calorific value and the consequent air admixture. It must always be remembered that consistency in composition should be aimed at. If this is effected, consistent calorific power follows automatically.

In many undertakings, large and small, no complaints have arisen when the calorific value has been gradually dropped. But many complaints have arisen when it is suddenly increased again—due to the complete stoppage of blue gas admixture.

Apart from legislative, manufacturing, and distribution problems, there are many interesting statistical aspects. For instance, our old hall-marks of prosperity—viz., price, and capital expended per million cubic feet sold, will cease to have their previous significance, as well as makes per ton and other working results. What will be the effect on "Field's Analysis" and similar tabulations? Shall we see all comparative figures collated on a "unit" basis or per half million thermal unts (1000 c.ft. × 500)?

The report, indeed, marks the commencement of a new era; and the responsible leaders of our industry must endeavour as individuals, as well as through the instrumentality of the National Council, to use it wisely, and so ensure in a great measure prosperity for the future. To have the report issued almost simultaneously with the reconstruction of the National Council is a fortunate coincidence, and is literally the "chance of a lifetime."

Benzol as a Motor Fuel.—In the course of a lecture at Liverpool, Mr. D. V. Hollingworth, referring to benzol as a motor fuel, said that both in specific gravity and calorific value benzol held the advantage over petrol; and though motorists bought their spirit by the gallon, the engine used it by the pound. Benzol was 1½ lbs. per gallon heavier than petrol; and, therefore, it was possible for a car carrying five 2-gallon cans to take 88 lbs. of benzol, as compared with 72½ lbs. of petrol. The coke-ovens of the country could produce 23 million gallons of purified benzol a year, the gas-works 15 million gallons, and tar works 3½ million gallons.

PERSONAL.

As is intimated elsewhere in this issue, Mr. John Young, the Engineer and Manager of the Hull Station of the British Gaslight Company, is, owing to considerations of health, retiring from the the Company, with whom, at the different works, he has had so long and distinguished a service. It will be seen that he is to be succeeded at Hull by Mr. H. E. Copp, at present Engineer and Manager of the Staffordshire Potteries station of the Company.

A report appears in our "Miscellaneous News" columns to-day that Sir Hallewell Rogers, M.P., has resigned his seat on the Birmingham Town Council, and consequently his office as Chairman of the Gas Committee.

It was the pleasure of the Chairman of the Imperial Continental Gas Association (Sir Charles Jessel, Bart.) to be able to announce that the Deputy-Chairman would shortly be known as Sir Arthur Lucas, the honour of knighthood having been offered to him by His Majesty. The name of Mr. Arthur Lucas has for, at any rate, the past four decades, been unostentatiously associated with the cause of charity, particularly in connection with the chairmanship of one of the medical institutions devoted to the relief of the sufferings of children. We join his numerous friends in congratulating Sir Arthur upon a distinction well merited.

The Chesterfield Gas and Water Board are advertising for a Gas Engineer and Manager, as they feel that the time has now arrived when it is due to Mr. W. T. Buckland, having regard to his forty years' service, to relieve him of some of his responsibilities. To this end, Mr. Buckland is being retained as Works Manager to assist the new Engineer; and he will continue to enjoy his present salary. Mr. Buckley was appointed Engineer upon the retirement of Mr. C. E. Jones.

On leaving Doncaster to take up the appointment as Assistant Engineer to the Stretford Gas Company, Mr. D. T. Livesey was presented by the staff and employees at the Doncaster Corporation Gas-Works with their good wishes, accompanied by a handsome silver hot-water jug and a cut-glass preserve-jar.

Among the members (four in all) elected to the Institution of Civil Engineers on the 29th ult. was Mr. John H. Brearley, of Milnsbridge, Huddersfield, the Engineer of the Longwood and Slaithwaite Gas Company.

OBITUARY.

Announcement was made in the daily papers last week of the death, on the 4th inst., at East Dulwich, of Mr. William Lyle Somerville, the youngest son of the late Mr. John Somerville.

Regenerative-Fired Gas-Retorts.—Quoting from Herr O. Peischer in the "Journal für Gasbeleuchtung," the "Technical Supplement" says the flue gases from recuperative-fired gas retort-settings form a considerable source of potential heat, though it is not at present commercially feasible to use it. The fuel consumption reckoned on the coal carbonized in such settings is placed at 18 p.ct. at least, under normal working conditions, though in new plants under test conditions much lower figures may be attained. With a plant devised by the Koppers Company, it is claimed that the fuel consumption can be reduced to 12 p.ct. of coke containing 15 p.ct. of ash and moisture. The heat is supplied from outside gas-producers with revolving grates consuming low-grade fuel; and the gas produced can be cleaned prior to entering the setting with advantage to the working life of the refractory material used. The gas and air are preheated to 1000° C. by regenerators, of which two pairs are built under each bed of retorts. The direction is reversed every half-hour.

Simultaneous Recovery of Ammonia and Sulphur.—Herr N. Berbelsmann, writing in the "Journal für Gasbeleuchtung," reviews, according to the "Technical Supplement," the proposals which have been made to reach a solution of the problems of the simultaneous recovery of ammonia and sulphur in the carbonization of coal. The processes of one class, including those of Fabry, Bergfeld, and Cobb, involve the washing of the gas with solutions of sulphates of heavy metals; ammonium sulphate being formed, and sulphide being precipitated. Here the sulphur is recovered separately from the ammonia, and has to be oxidized to sulphuric acid. Burkheiser's process, using iron compounds, appears to have failed; also Fritzsche's process, in which aluminium sulphate is used. In another group of processes, ammonia is fixed as ammonium sulphite, which is then oxidized to the sulphate. Atmospheric oxidation processes seem to be limited by the attainment of equilibrium conditions; while oxidation in solution is attended by loss of both ammonia and sulphur dioxide. Owing to the difficulties attending the considerable dissociation tension of sulphites, Feld devised a process based on the oxidation of thionates, in its more recent form without the use of metal salts. In spite of the way in which the process has been scientifically perfected, in practice it has proved too cumbersome. Other processes employing thionates have been proposed; but it is concluded that the method of oxide purification and sulphuric acid manufacture still remains commercially the most satisfactory.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Cardiff.

UNDER the presidency of Mr. REGINALD G. CLARRY, the Engineer, Manager, and Secretary of the Swansea Gas Light Company, the Institution met last Wednesday morning in the Board-Room of the Cardiff Gas Company, to carry through a programme which proved much too long for the time at disposal. Of three discussions appearing on the agenda one only was taken—that opened by Mr. J. H. Canning, of Newport, on the "Most Suitable Standard Quality of Gas." As always, the Cardiff Gas Company proved the kindest of hosts; and as, owing to an afternoon conference of the British Commercial Gas Association, it was impossible for the members to pay the customary visit to the Grangetown Gas-Works, it was stated that the Company would welcome another meeting of the Institution there in a few weeks' time.

The meeting having been called to order by the PRESIDENT (Mr. Reginald G. Clarry, of Swansea), the minutes of the last meeting were read and confirmed.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) announced the receipt of a number of letters of apology for absence.

NEW MEMBERS.

Proposed by Mr. J. ROBB (Chepstow), seconded by Mr. J. MOGFORD (Briton Ferry), the following new members were elected:

C. Missenden, Blackwood.
Ernest Ablett, Swansea.
Harold Matterface, Monmouth.
W. W. Taylor, Treharris.
Bertram Taylor, Treharris.

Transfer from class of Student to Member: Henry G. Horwood, Caerphilly.

REPORT AND ACCOUNTS.

The HON. SECRETARY read the report and accounts; the latter showing a balance in the Treasurer's hands of £23 10s. 10d. The fourteenth annual report stated that during the year three members joined the Institution, two died, and four resigned, leaving the number at the end of the year at 66 members and three students. The Council regretted to have to report the death of Mr. Thomas Canning, the first President of the Institution, and expressed their desire to place on record "their high appreciation of the services rendered by him to the gas industry, and to this district in particular, extending over a long period of years." Mr. W. T. Kensbole joined the Colours during the year, making a total of six from the Institution. The new National Gas Council had been formed during the year; and the Council hoped those members who had not joined would do so as early as possible, so as to present a united front to the country.

Mr. J. E. KENSHOLE (Merthyr), in proposing the adoption of the report and accounts, said he thought the members would agree that, taking into consideration the conditions which had prevailed, they had had a fairly successful year. Unfortunately, during this period they had lost their first President, Mr. Thomas Canning—a gentleman whom they all esteemed and admired.

Mr. MOGFORD seconded, and added his tribute to the late Mr. Canning, whose election to the chair it had been his pleasure to propose at the first meeting of the Institution. He had always been the mainstay of the Institution and the leader in discussions at the meetings. They would miss him greatly; and he (Mr. Mogford), at any rate, felt that he had lost a friend.

The report and accounts were adopted.

NEW OFFICE-BEARERS.

The following office-bearers were elected for the ensuing year:

President.—Mr. A. J. Bond, of Aberavon.
Vice-President.—Mr. J. Robb, of Chepstow.
New Members of Council.—Mr. W. C. Jackson, of Neath, and Mr. E. H. Swain, of Pontypridd.
Hon. Treasurer.—Mr. H. Morley, of Teignmouth.
Hon. Secretary.—Mr. Octavius Thomas, of Pentre.
Hon. Auditors.—Mr. G. S. Davies, of Risca, and Mr. D. J. Davies, of Hirwain.

The PRESIDENT, in proposing Mr. Bond's election, said their experience had been that as good men attained the chair from the smaller as from the larger works. They had recently had an example of this in Mr. Mogford, who came from the same district.

Mr. MOGFORD pointed out that Mr. Bond was one of the original members of the Institution. His practical work compared very favourably with that of other members in the district.

Mr. KENSHOLE, referring to the election of Vice-President, said Mr. Robb had done very excellent work; and if he carried out his duties to the Institution as he had those as Manager of the Chepstow gas undertaking, there would be no cause of complaint.

BENEVOLENT FUND OF THE INSTITUTION OF GAS ENGINEERS.

The HON. SECRETARY proposed that they should contribute the usual sum of two guineas to the Benevolent Fund of the Institution of Gas Engineers. At the same time, he emphasized the need for further individual subscriptions.

Mr. G. MAYNE (Penrhiwceiber) seconded, and it was agreed to.

PROPOSAL TO DISSOLVE THE SPECIAL PURPOSES SECTION.

Mr. MOGFORD said he had to put before the meeting his reasons for wishing that the work of the Commercial Section should be transferred to the District Executive Board of the National Gas Council. As he had previously said, he did this from no lack of appreciation of the work done by the section. There could be no question that it had been the whole life of the Institution for a number of years. It had done excellent work, and had brought the members all together. This bringing together of itself had been of infinite benefit to all of them and to the industry generally; but he felt they had so many of these meetings now, and so many Associations and Institutions, that there was a likelihood of considerable overlapping. This could hardly be to the benefit of their industry or of themselves. There was in these days little time to spare; and therefore they should cut-down the number of Associations. To his mind, two were quite sufficient for the purpose; the work would be done better under two than under four or five as at present. With the National Gas Council and the District Executive Board, the whole of the commercial side of the industry would be well looked after. Then with the Institution of Gas Engineers and the District Institution the technical side of the business should be adequately guarded. Therefore he proposed, not that the Commercial Section be abandoned, but that its work should be transferred to the District Executive Board of the National Gas Council.

Mr. W. C. JACKSON (Neath), in seconding, remarked that it had been patent to many of them in the past that they had lacked in the Commercial Section the necessary power for dealing finally with any matters that came before them. They had to consult their boards, and a lot of time was lost. By transferring the work as suggested, it was more than likely they would be able to get questions settled right away.

The PRESIDENT: The resolution is really a confirmation of the decision arrived at by the Special Purposes Section themselves.

Mr. J. H. CANNING (Newport) agreed with the views Mr. Mogford had expressed, but asked whether they had power at that meeting to dissolve the section. Also, what had other District Associations done in the matter.

Mr. J. E. KENSHOLE (Merthyr) said he was sorry to have to disagree with the proposal. He believed that the Commercial Section was the life of the Institution. There were matters discussed now at some of the meetings which he was quite convinced members would not bring forward if their directors or committeemen were present. If necessary, meetings of the Special Purposes Section could be held before the other meetings. Then little time would be lost.

The HON. SECRETARY, answering Mr. Canning, said that according to the rules six months notice of such a resolution had to be given. Mr. Mogford raised the question in September; and the Council agreed to accept this as six months' notice. He read letters from the other Commercial Sections.

The PRESIDENT said the Special Purposes Section came to the determination to relegate their work to the National Gas Council. The District Board of the Council met each month, and possessed the advantage of having the whole of the members of the Special Purposes Section to attend, together with the employers. This added considerable weight to the deliberations.

The HON. SECRETARY: It is for the Institution as a body to say whether the section shall be dissolved.

The PRESIDENT: It was agreed that the section should remain dormant until some decision was taken. It is not dissolved.

Mr. MOGFORD said there was one other point. They were all anxious that every undertaking should come within the scope of the National Gas Council. Now there was a very serious difficulty with many councils, because there were so many of these different societies they had to subscribe to. One bigger subscription as an inclusive fee would not trouble them so much. If they hoped to bring every undertaking in they should take this into consideration.

Mr. CANNING said that in view of the fact that no other District Association was taking the step which their Institution contemplated, he thought it would be highly unwise for them to precipitate matters. He quite agreed it was desirable that they should all join the National Gas Council; but surely it was not necessary that they should apply compulsion. The National Gas Council, he thought, would prove its worth; and eventually they would all find it to their interest to join. But it would be very unwise to destroy one society before the other was fully in the saddle. He proposed as an amendment that Mr. Mogford's proposition be given consideration at the next annual meeting, which was the meeting competent to deal with the matter. In the interim, if they wished to suspend the meetings of the section, they could do so.

Mr. T. E. FRANKLIN (Barry) seconded the amendment, and expressed the view that the National Council would have quite sufficient to do for a considerable time, without dealing with such matters.

Mr. ROBB thought it was not so much a question of the two sections as of making themselves a power in the land. As managers they had not the same authority to press matters forward as a composite body would have. He supported the resolution.

The PRESIDENT then put the matter to the vote, and announced that 23 had voted for the amendment and 8 for the resolution.

THE SALARIES QUESTION.

Some discussion then took place regarding the question of salaries for engineers and managers; further consideration of the matter being adjourned until after the annual meeting of the Institution of Gas Engineers.

THE MOST SUITABLE STANDARD QUALITY OF GAS.

The PRESIDENT then called upon Mr. J. H. CANNING to open a discussion upon the "Most Suitable Standard Quality of Gas."

Mr. Canning's remarks, with those of other speakers, will be found in the next column.

An Extra Meeting.

The President explained that it had been decided to hold the British Commercial Gas Association conference on the afternoon of the Institution's regular meeting, and it was felt by some of the members that they would be rather done out of the visit to the Grangetown works which they looked forward to very much whenever they met in Cardiff. It had therefore been suggested by the management at Cardiff that the visit to Grangetown should merely be regarded as having been deferred, and that, subject to satisfactory arrangements being come to between them and Mr. Thomas, an afternoon in June should be spent at Grangetown, when they could take up their discussions and look round the works.

Thanks to the Cardiff Gas Company.

Mr. T. H. Hazell (Newport) proposed a hearty vote of thanks to the Chairman and Directors of the Cardift Gas Company, who had placed at their disposal a room for the meeting.

The Hon. Secretary seconded the vote, which was very cordially agreed to.

Place of Next Meeting.

On the proposition of the President, seconded by Mr. Bond, it was left with the Council to decide upon the place of next meeting.

The Gas Company's Hospitality.

The members then betook themselves to the Park Hotel, where they were the guests of the Chairman and Directors of the Cardiff Gas Company at luncheon. Mr. C. E. Dovey, J.P. (the Chairman) presided.

The Chairman proposed the "Loyal Toast," and subsequently that of "The Wales and Monmouthshire District Institution of Gas Engineers and Managers." He spoke with regret of the loss of Alderman Canning, whose presence was always so welcome at their gatherings. He was a man of great sincerity, and one who did very good service in his day. He wished to extend to the family—and to his son in particular—their condolence in the very severe bereavement which had fallen upon them. He saw that they had been discussing the question of salaries of gas engineers and managers. This was quite a proper subject for them to take up. The Directors of the Company were in full sympathy with it. He hoped that the members arrived at a satisfactory conclusion; and when the matter came before his Board they might be sure that it would receive sympathetic consideration. If any body of men had distinguished themselves during the time of the war, he thought it was the engineers and managers of gas-works. He coupled with the toast the name of Mr. Reginald Clarry, and said that, in his opinion, Mr. Clarry was going to be heard of a good deal in the gas profession. His earnestness, application, and energy would bring their rewards; and he would reach greater heights, though he had already accomplished a great deal for one so young in being at the head of the important undertaking at Swansea. They saw in him a "chip of the old block."

The President, in response, said the Institution were deeply indebted to Mr. Dovey and the other Directors of the Cardiff Gas Company for the encouragement they had given them, not only that day, but on every possible occasion. Reference had been made to the question of salaries. He did not remember such a subject arising before on the agenda; and it was understood on this occasion that it did not refer to the majority of them, who were well treated, but applied to those unfortunate ones whose committees or directors could not appreciate the change that had taken place during the last four or five years. The Government had been blamed very much because of their attitude towards gas undertakings; but he thought this had to a great extent been brought upon the gas industry by its own lethargy in the dim and distant past. If they had acted differently, and had possessed the same organization as to-day, they would not have been treated in this way. Now they were bringing to bear all the strength they could to make the industry attain the position that it rightly should hold.

Mr. Hazell proposed "the Chairman and Directors of the Cardiff Gas Company," and referred to the kind hospitality the members were enjoying. It was, he said, characteristic of the Board to take the lead in all movements connected with the industry; and they would all appreciate the allusion made by the Chairman to the delicate and yet important question of salaries. There was a time when it was suggested that the gas industry should be placed under control; and then there was a modified suggestion that it should be certified only. If the choice were given once again, it would be in favour of control, because they knew that those who had been under control had had good times. They had been well paid, well looked after, and well maintained in respect of their profits and dividends. But gas undertakings had had to feel their way like blind men in a dark alley. Whatever position they had reached in the meantime, they had great hopes for the future. They had greater hope that the present Parliament would do something to justify all the demands they had made on the industry.

The Chairman returned thanks, and mentioned that last June the Directors were faced with a position that they had not had to deal with for a matter of fifty years, when they could not pay their maximum dividend without drawing on the reserves. But great joy came to them in December, when they discovered that they could preserve their long record of payment of maximum dividends to the shareholders. The Directors always strove to do the right thing; but they could not make much headway unless supported by a powerful and energetic executive, in which respect Cardiff was peculiarly well situated. He had to express gratitude to those officers who had kept the flag flying in very distressing circumstances.

In an adjoining room the members re-assembled for the British Commercial Gas Association Conference.

THE MOST SUITABLE STANDARD QUALITY OF GAS.

[A Discussion at the Cardiff Meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers, May 7.]

By J. H. Canning, of Newport.

I have been asked by our Secretary to open a discussion as to what is the most suitable standard quality of gas; and I wish to preface my further remarks by stating most emphatically that I have always considered that the imposition upon gas undertakings of a fixed standard of quality has been productive of very great injury to the interests not only of the undertakings themselves, but more particularly of their consumers; and the present war will not have been an unmixed evil, inasmuch as it has compelled all those concerned to experiment boldly on new lines.

As a result of many years' consideration of this subject, I have come to the conclusion that the most suitable quality of gas for general supply is that which, having full regard to circumstances of time, place, and other contingencies, will provide a satisfactory and efficient supply of light, heat, and power to the consumer at the lowest possible price. It is quite unnecessary to point out to a meeting such as the present, how greatly our industry has been retarded in its development, and how much the interests of consumers have suffered owing to the well-meant, but misguided, efforts which have been made in the past to impose a practically uniform standard over the whole country. The standards at present in vogue are based on the gas-works' practice of some sixty years ago, and do not permit of the full extension of modern methods and processes. It is a great tribute to the vitality of the industry that it has been able to thrive under such very unfavourable conditions.

Since I was asked to open this discussion, the Fuel Research Board have made their report and recommendations to the Board of Trade; and it is very satisfactory indeed to find that they suggest that greater scope shall in the future be permitted to gas undertakings, while at the same time the interests of consumers will be amply safeguarded by the fact that it is proposed that they shall purchase heat units in place of cubic feet of gas. In these circumstances, it is perhaps advisable to say as little as possible upon this very important subject; but there are two or three points which hardly come within the terms of reference to the Fuel Research Board upon which I may be permitted to make a few observations.

In the first place, it has become an accepted fact that the manufacture of gas should result in the production of a totally disproportionate quantity of residuals—more especially coke. The coke market is always a fluctuating one; and the gas consumer is frequently called upon to pay for a drop in the price of coke, especially when, as is often the case, the fall in the value of coke does not coincide with a fall in the value of coal. At the same time, the distribution of a solid fuel, such as coke, involves—especially in present circumstances—very heavy haulage charges, together with the wear and tear of both vehicles and roads; while the consumer is subjected to all the inconveniences attending the use of a solid fuel. I do not propose to present figures of comparative costs, which each of us may easily prepare, taking into account his own conditions; but I do maintain that in the majority of instances it will be to the advantage both of the producer and the consumer of gas that a very considerable proportion of this solid fuel should be distributed in the much more cleanly and convenient form of gas.

I can give one or two interesting figures upon this point. As, for instance, in our own case we are able, by an expenditure of power not exceeding 10 H.P. to distribute per hour the equivalent in potential heating value of some 2 to 3 tons of coal. This is delivered in a quiet and cleanly manner to something like 14,000 or 15,000 consumers over an area of some 60 to 70 square miles, without dirt or trouble of any description. You are as well able as I am to compare with this all the fuss that goes on in the distribution of a similar quantity of solid fuel. You will have to multiply the 2 or 3 tons by 5 or 6 in order to get the equivalent value. Then you have the noise and rattle in the streets, and the carrying of the fuel into the houses, the sweeping-up, the lighting of fires, and so on. It seems to me extraordinary that the population of this country, which is an intelligent one, should have been content to put up with such a state of affairs for so long.

It is quite true that there may have to be some rearrangement of gas appliances and burners; but, after all, the burner should be made for the gas, and not the gas for the burner. There would be no question of the consumer suffering any disadvantage if the new system of charging by heat units were adopted. It may here be objected that the distributing system of many gas undertakings might require a certain amount of reconstruction if this suggested course were adopted; but I venture to say that comparatively slight modification would probably effect all that was needed, provided that the gas supplied did not contain an undue percentage of inert constituents.

The Fuel Research Board have recommended that a maximum limit of 12 p.ct. be imposed in respect of the inert constituents in gas. With regard to the actual amount to be allowed, opinions may differ. The figure in question is certainly open to criticism, inasmuch as the gas made from different coals, even where there

is no suspicion of over-exhausting, shows great variation in the amount of inert constituents present.

Coal on an average contains about 30 lbs. of nitrogen per ton, which is equivalent to a little over 360 c.ft. The proportion of this which is evolved as free nitrogen in the gas has been estimated at from one-fifth to one-third of the total. But even calculating that the whole of the nitrogen present in the coal passes in a free state into the gas, it would not exceed 3 p.ct. by volume; and it seems from the figures of analyses of certain gases that the origin of free nitrogen in gas might be made the subject of research. With regard to the limit of 12 p.ct. of inerts, I think we should not be too easily prepared to accept sweeping generalizations on this subject. For instance, there is the analysis made by Coste in in 1909, of gas produced in a small village gas-works where there was no exhauster. This contained no less than 6·79 p.ct. of nitrogen. It was a 713 B.Th.U. gross gas, and 21·77 c.p. with the No. 2 "Metropolitan" argand. It seems difficult to understand the origin of this nitrogen.

Then the same authority gives two analyses of Metropolitan gas which are very interesting, as showing the small influence exercised by the inerts within certain limits. An unlimited proportion of inerts is bound to exercise a prejudicial effect. Each of these two Metropolitan gases had the same calorific value of 576 B.Th.U., and were of practically the same illuminating power, 16·58 and 16·21. And yet the one gas contained 5·35 p.ct. of inerts and the other 14·43 p.ct. Both analyses were made in the same year. Frankland's analyses of London gas in 1851 showed as high as 5 p.ct. of nitrogen; and analyses by Humpidge in 1876, as high as 9·73 p.ct. Dr. P. F. Frankland's analyses all over the country, in 1882-4, show over 10 p.ct. of nitrogen in two instances; and in each the calorific value was well over 600 B.Th.U.

In view of all this, I think the question of inerts should receive very careful consideration. This is a matter that, to my mind, has not yet been fully investigated. The Fuel Research Board are proposing to give you liberty in every other respect, and to tie you down to a certain limit of inerts; and it is as well that we should see that it is a limit we are able to work to, not only when our plant is new and in good condition, but also when it has deteriorated and is nearing the point at which we shall have to repair it. In other words, we must take into account all the working conditions.

These inert constituents, when present in excessive quantities, increase the difficulty of distribution very considerably, and they reduce the flame temperature of the gas. I think therefore that, in their own interests, gas undertakings will be bound to recognize that it is bad business to permit the inerts to exceed a reasonable percentage. There is, of course, an irreducible minimum, varying with the coal and the conditions of working, and as far as possible it will be wise, in my opinion, to approach as nearly as maybe to this.

The report of the Fuel Research Board makes little or no reference to the very important question of flame temperature. It is quite possible to have a gas of high calorific value which will nevertheless give very disappointing results when used for purposes the efficiency of which depend on heat or light radiation. It has been conclusively shown that radiation varies approximately as the fourth power of the temperature. In these circumstances a drop even of a few degrees in flame temperature may have a very prejudicial effect upon the efficiency of gas-fires or incandescent burners. One requires, of course, what may be called the mass-effect of a fairly substantial calorific value, in addition to the flame temperature or intensity effect; but I certainly think that this problem can be solved in such a way as to satisfy both demands efficiently.

With respect to the proposal to charge on the basis of thermal units supplied, I will venture to offer no definite opinion at present excepting to say that it is questionable whether the consumer will ever really understand it. The average consumer has never been able to fully master the supposed intricacies of the present system based upon the cubic foot; and I am afraid that if the proposed new arrangement is carried into effect he will be more mystified than ever. I am very much afraid he will consider it a new method for getting him to pay more for his gas, and that would certainly be disastrous. There is one danger which is apparent on the surface—namely, that if you alter your standard of calorific value as provided for by the Fuel Research Board report, the consumer will expect to have a reduction in price. But it is possible, as the experience of the recent war has shown us, that you may be compelled by circumstances over which you have no control whatever to lower your quality while at the same time your cost of production goes up. In these circumstances, it will be very difficult to persuade the consumer that he should, in justice, pay the same money (or more) for an article which has certainly deteriorated to some extent in value.

Then there is another point which I have not yet seen fully explained by those who propose this scale; that is the question of dealing with the prepayment consumer. You do not present him with a bill; and, consequently, I do not see how you are going to charge him by thermal units. But though the consumer may thus be more puzzled than ever, there is at the same time no doubt that it is a proper and scientific method of charging, and a method, moreover, which enables you to compare the service you offer with that rendered by your competitors. As such, I certainly think some change of the kind would be most acceptable.

I should like to suggest, in conclusion, that the British thermal unit is far too small a unit for use in this connection. You can quite imagine that some of your consumers' bills will run into millions of thermal units; and it seems to me the mere labour of calculating these out is a thing which ought to be taken into account. I would suggest, therefore, as a convenient unit, that it should be equivalent to 1000 B.Th.U., and that we call it a kilotherm or megatherm.

DISCUSSION.

The PRESIDENT (Mr. Reginald Clarry, of Swansea) said they could not have had a question more topical than that with which Mr. Canning had just dealt—the quality of gas and the method of charging by heat units. The Technical Press had published some excellent articles in connection with the Fuel Research Board; and the subject was well in mind. The Fuel Research Board had suggested that the gas undertaking should get into agreement with their consumers as to the quality to be supplied; and if this arrangement with the consumers involved any adjustment or alteration of the burners, the gas undertaking was to bear the expense. He had been endeavouring roughly to get out a calculation as to what this would amount to in his particular case. They had been supplying 500 B.Th.U. gas; and he wanted to find out what it would involve if they fixed upon a standard of (say) 466 B.Th.U. He, however, found it almost impossible to come to any conclusion.

Mr. H. D. MADDEN (Cardiff) said there was one point in Mr. Canning's remarks to which he would like to call attention. He had shown them how he could distribute the equivalent of some 10 tons of coal in a gaseous form, and compared it with the drawbacks of a coal-fire. This, however, was only a part of the story. The most awful sin was when the fire was started, and the products went away up the chimney in the form of soot, instead of being gasified, and the ammonia and other residuals being recovered. This dreadful waste was what they had to fight against. As to the question of gas quality, it was very difficult to state at the present time what would be the standard. He was of opinion that, though the calorimeter might indicate a certain number of heat units, there were other important factors which governed the application of this gas in its highest efficiency. He had proved that one could make two gases of equal B.Th.U. value, and apply them to certain work—say, a gas-fire—and one of these gases would give a far greater flame result than the other one. Therefore it seemed to him there must be other factors—the composition of the gas, and so on. Before anything was absolutely determined upon, this matter must be investigated, as it was being by the members of the Gas Investigation Committee and the Fuel Research Board. More would be heard of the question before it was finally settled.

Mr. J. E. KENSHOLE (Merthyr) agreed with the remarks made with regard to the difference in efficiency that one might get from two gases of approximately the same B.Th.U. value. In some cases reducing the gas to 466 B.Th.U. led to complaints; whereas, on the other hand, they had heard of an instance of 360 B.Th.U. gas being distributed without complaint resulting. In fact, they were told that the consumers were better satisfied than before. [Laughter.] There was no discoloration of the burners, furring-up of the bye-passes, and so on. This proved conclusively that there was a lot of research work to be done. But going back to the remarks with regard to arranging with the consumers as to what quality of gas should be supplied, he did not think that this could be done. Their Acts of Parliament would not allow them to go to the consumer and persuade him that 450 B.Th.U. gas would be suitable for distribution, and he would be able to get it at a so much cheaper rate. They would have to go to Parliament for this power; and within (say) the last four years, during the period of the war, he had known of Bills that were before Committees where 475 B.Th.U. had been asked for, and refused. With regard to charging for the B.Th.U.'s distributed, surely in the majority of instances they were doing this at present. Personally, he did not see that there was any great advantage to be obtained by charging as suggested If they had a minimum below which they must not go, and were subject to penalties, he did not understand what was to be gained by altering the method of charging from cubic feet. It would befog the consumers to a greater extent than they were befogged at the present time.

Mr. W. C. JACKSON (Neath) remarked that it certainly was very encouraging to the gas profession to see the Fuel Research Board break away from the old traditional standard. It was proved that in certain districts a certain quality gas very much lower than in another district had given every satisfaction, while some other town would be up to its eyes in trouble from the same cause. For this measure of relief let them be thankful. The composition of the gas had very great influence upon what took place in cookers, fires, and so on. He hoped the gas industry would see that—now the Fuel Research Board had recommended a certain amount of freedom—they should stick to it. As Mr. Canning had said, they must see that the relief they were getting in regard to B.Th.U. value was not going to be invalidated by too difficult and drastic restrictions on the percentage of inerts.

Mr. MADDEN at this point proposed that the discussion be adjourned to the next meeting. He remarked that they could not do justice to the subject if they curtailed it. As the next meeting would probably be coming on in June, they might by that time have obtained later information, and be able to go further with the discussion.

The PRESIDENT said he quite agreed with this suggestion, particularly in view of the fact that they would no doubt get a lead from the parent Institution, who would be meeting this month.

The discussion was thereupon adjourned until the next meeting of the Association.

Statutory Undertakings (Temporary Increase of Charges) Act, 1918.—The Board of Trade have made Orders under the above-mentioned Act in favour of the Tenterden and District Gas Company, Ltd., and the Bordon and District Gas Company. Applications to the Board of Trade have been made by the Richmond Gas Company, the Rothwell Gaslight Company, the Sittingbourne District Gas Company, and the Tynemouth Gas Company.

SOCIETY OF CHEMICAL INDUSTRY.

A Triple Bill.

At a Meeting of the London Section of the Society of Chemical Industry, which was held on Monday evening last week at Burlington House, Piccadilly, the name of Dr. Percy E. Spielmann, B. Sc., F.I.C., was associated with what he termed a "triple bill." That is, there were three papers, in connection with each of which his name appeared as joint author.

Before, however, proceeding to the consideration of these, the Chairman (Dr. C. A. Keane) referred at some length to the arrangements made for the annual meeting of the Society in July [*ante*, p. 195]. He also announced the result of the voting for the six vacancies on the Committee; Mr. E. V. Evans, the Chief Chemist to the South Metropolitan Gas Company, coming out at the head of the poll.

Estimation of Carbon Disulphide.

The first paper was by Dr. Spielmann and Mr. F. Butler Jones, B.A., A.I.C., and consisted of a critical examination of the various methods usually employed for the estimation of carbon disulphide. Though the work done was based on the estimation of carbon disulphide in benzol, the results were stated to be fully applicable to carbon disulphide in other mixtures. All the methods except one depend on the extraction from the solution of the carbon disulphide by means of alcoholic potassium hydroxide, whereby potassium xanthate is formed. The difference in specific gravity before and after the removal of the carbon disulphide affords a good method of estimation. The oxidation of the xanthate solution by bromine and precipitation as barium sulphate is a very accurate method. A considerable amount of work was done on the volumetric and gravimetric methods, based on the formation of copper xanthate, by precipitation of the potassium xanthate solution with copper sulphate in presence of acetic acid. Neither of these methods was, however, found to be as satisfactory as was expected. Experiments were carried out with the xanthate method by employing lead xanthate; but the results were low. The precipitation of carbon disulphide by phenyl hydrazene constitutes a fairly sensitive qualitative test.

Estimation of Thiophene.

The second communication dealt with the estimation of thiophene, and was submitted by Dr. S. P. Schotz, co-author with Dr. Spielmann. It was pointed out that the estimation of thiophene in benzene is a problem of importance to certain industries in which benzene is used. It has been found that aniline prepared from benzene containing thiophene resinifies much more readily than aniline prepared from thiophene-free benzene; that the yield of resorcinol is much diminished unless only very little thiophene is present; that much more resin is formed in aluminium chloride condensations if thiophene be present; and that thiophene acts in an inhibiting manner in certain other catalytic reactions. The published information on this matter is so very scanty and contradictory, that it was considered very desirable to examine the methods closely. As the result of their investigation, a method that the authors recommended, which gives very consistent results, consists of shaking the sample with an aqueous solution of basic mercuric sulphate in the cold. Under these conditions, only thiophene, and none of the accompanying substances, reacts.

Estimation of "Free Carbon" in Tar and Pitch.

Dr. Spielmann and Mr. Henry Wood contributed the third paper, on the estimation of "free carbon" in tar and pitch. Mention was made of the universally accepted fact that "free carbon" in tar and pitch does not consist of carbon in the chemist's sense of the word, but of substances containing a high percentage of carbon, and having a high molecular weight. These compounds show a very low solubility, so that accompanying substances can be extracted from them. Personal experience has confirmed that the usual solvents employed do not all lead to the same results, and serious discrepancies occur between different workers. The object of the investigation made by the authors was to determine the extent and rate of extraction of the soluble substances in tar and pitch by various solvents, as well as to ascertain the relative value of the several recommended methods and liquids. Incidentally, some knowledge has been obtained as to the effect of the type of still used when distilling tar on the "free carbon" content of the resulting pitch.

The solvents used, alone or in succession, were benzol, carbon disulphide, carbon tetrachloride, ether, chloroform, xylol, pyridine, and a neutral tar oil. It was found that benzene followed by carbon disulphide gave the lowest and most consistent result. Ether was so far successful that it removed nearly all the soluble material; but the final extraction was very slow. Carbon tetrachloride did not remove more than ether for about the same time of extraction; but if followed by carbon disulphide and benzene, the final figure for "carbon" was considerably higher than if the last two solvents were used alone. Neutral oil gave much trouble; and the extraction was very slow. Chloroform was not found to present any advantages over benzene and carbon disulphide. Xylol was efficient, but slow. Pyridine extracted well, but corroded the corks so much that it was not convenient.

It was found that the commercial pitch contained less "free carbon" than a sample of pitch of the same softening-point obtained in the laboratory from a copper flask. Further, a pitch produced in a Colman's iron still primarily designed to produce light fractions contained a higher percentage of carbon than did a pitch of similar softening-point obtained from the same tar distilled from a copper flask.

The figures submitted showed, in the first place, that the best solvent—*i.e.*, that leaving a residue most nearly approaching to "carbon"—is pyridine. This, however, has the disadvantage of having to be used in an all-glass apparatus. The second most desirable is the combined benzene-carbon disulphide solvent, employed as they direct; and this they recommend for general use. In the second place, there is a fairly constant relation between the softening-point of the pitch and the "free carbon" it contains. Thirdly, results, while frequently being closely consistent, may vary by 2 p.ct.

Discussion.

Dr. Ormandy said that, in view of the fact that the material which it was required to determine was not homogeneous, it was not surprising that by using different substances different residues were left behind. The tar which was the first body to condense from the distillation of the coal would be a black viscous liquid, according to the temperature employed; and there would be practically no insoluble matter in it whatever. If this tar were heated-up, the proportion of material which was then insoluble might amount to 20 or 25 p.ct.—it might, indeed, become what one found in normal pitch. It was quite likely one would get different results with various extracting mediums, according to the order in which they were used, with all of the residues, if it was not pure carbon—which they were pretty sure it was not. This material was almost certain to have a tremendously high absorptive capacity. He thought it was extremely probable that, even in drying at 100°, quite measureable quantities of the various solvents might be retained by the carbonaceous matter. At any rate, it might be of interest to those present to know that Walter Feld, when working on his process for the collecting of the bye-products from the distillation of coal by fractional distillation, discovered that the tars in the first chamber contained only ½ to 1 p.ct. of matter insoluble in benzene; but it was impossible to bring them up to 200° or 300° C. without causing large separation of so-called carbon. When they subjected the tar to cooling, and then afterwards to distillation, it was not wonderful that very considerable amounts of these condensation products were formed. Was the ratio of hydrogen to carbon in the residue determined?

The Chairman asked whether the estimation of "free carbon" in pitch was of any real technical value. And they had to bear in mind that the method was purely empirical; it might be anything between carbon and a highly carbonaceous substance. Was the "free carbon" a factor which was a guide to any industrial applications?

Dr. Spielmann, in reply, said the question of absorption was important. They had not determined the proportion of carbon to hydrogen. It was not really their business to do so. Here was an empirical method for getting an insoluble residue; and they were testing suggestions made for this purpose, and not the actual composition of the residue. With regard to the technical value of the determination, when pitch was used in a mixture as a fuel, and fired by a spray under a boiler, it was important that the free carbon should be as low as possible. Otherwise there was trouble.

Dr. Ormandy remarked that, in the utilization of tar oils for Diesel engine purposes, the question of the amount of carbonaceous matter in the tar oil settled to a very large extent whether the oil was suitable or not suitable for use in a Diesel engine. He believed, also, that for road-making purposes the value of the material was very closely associated with the quantity of insoluble matter present.

The Chairman said that with oils it was quite understandable that any product which easily separated out was important; but with pitch, where they were dealing with a solid, it did not seem a very important point.

Dr. R. Lessing said that pitch was used mostly in briquetting; and in that case the maker looked for a binder, and regarded (rightly or wrongly) the free carbon as an inert material. The bulk of free carbon, and certainly that which was truly free carbon, was undoubtedly an inert material; but it was just a moot point whether the hydrocarbon or asphaltic matter that was absorbed by the carbon particles had not possibly as good binding qualities as, or better than, the readily soluble bitumen. It was certainly diluted to a large extent by the free carbon, which in ordinary pitch amounted to 50 p.ct. Tars differed very widely in their free-carbon content. Tars from horizontal retorts had up to 30 p.ct., whereas tars from vertical retorts only had from 4 to 5 p.ct.; and it would be rather interesting to have Dr. Spielmann's comparison of these tars. In working-up a tar into a pitch, Dr. Spielmann had mentioned that, in the case of the stills he employed, the effect upon the amount of free carbon found afterwards was very great. He had personally found in many cases that the increase in carbon content from the original tar to the equivalent amount of pitch made from that tar was practically a function of the design and working of the still. It certainly might increase the original carbon content by something like 10 or 12 p.ct. As this was regarded as detrimental by the briquette maker, it was of course a thing to be avoided in tar distillation. With regard to the composition of the free carbon, a very simple method of getting at the approximate composition of the carbon left behind was to apply the ordinary coking test, although this again was empirical. Nevertheless, it gave a comparative value, and showed how much volatile matter was left behind after the solvent had been removed.

Calorific Power Orders.—The Local Government Board have just issued an Order, under the Gas (Standard of Calorific Power) Act, 1916, substituting a test for calorific value of 500 B.Th.U. for the illuminating power test prescribed in the Spalding Urban District Council Act of 1903. The Board of Trade have made an Order under the Act in favour of the Rochester, Chatham, and Gillingham Gas Company.

SOCIETY OF BRITISH GAS INDUSTRIES.

THE Annual General Meeting of the Society was held last Wednesday at the Connaught Rooms, Great Queen Street, W.C.—Mr. ARCHIBALD P. MAIN, the Chairman of the Council, presiding. There was a large attendance of members.

The formal business was taken at a morning sitting; and the first item was the confirmation of the minutes, on the proposition of the CHAIRMAN.

ANNUAL REPORT.

The annual report was next submitted. In the first place, regret was expressed at the loss by death of Mr. Robert B. Main (Chairman of Glover and Main, Ltd.), and Mr. John H. Bennet and Mr. Andrew Mackenzie, two Directors of Alder and Mackay, Ltd. Then mention is made of honours for services rendered to King and Country; and in this connection, congratulations were offered to the following gentlemen: Sir Alfred Keogh, G.C.V.O., Sir Henry E. Duke, Lord Justice of Appeal, Col. Arthur Smithells, C.M.G., Professor Harold B. Dixon, C.B.E., Sir T. Harris Spencer, K.B.E., Sir William J. Jones, K.B.E., Lieut.-Col. W. R. Glover, C.M.G. Gratification was also expressed that Mr. John West had been awarded the Birmingham Medal of the Institution of Gas Engineers. The following paragraphs are of special interest:

The National Gas Council has been reconstituted on a new basis, which we trust will be of great service to the gas industry. But we regret that the opportunity was not taken to give our Society the position in that Council which we consider was due to the intimate relations existing between us and the whole gas industry. We believe, however, the time is not far distant when the Society will receive due recognition of its services to the industry. In the meanwhile, we shall be represented on a Joint Standing Committee of the National Gas Council.

The National Gas Council, having recently become associated with the Federation of British Industries, invited our Society to be represented on one of the Committees, which enables us to keep in close touch with that body.

The Society has been represented on the Parliamentary Committee of the Institution of Gas Engineers which is dealing with the very important matter of preparing a report for presentation to the Government on the conservation of coal from the gas industry's point of view, as legislation is contemplated with regard to the electric power supply of Great Britain in the near future.

Your Council have submitted to the Board of Trade suggestions for the protection of British manufacturers of gas apparatus from enemy competition; and the National Gas Council have appointed a small Committee to co-operate with us in this very important matter.

References to excess profits, and the life, rating, sizes, and capacities of gas-meters, led up to the subject of refractory materials, which still continues to engage the close attention of the members of the Fireclay Section, who have subscribed a further sum of £150 as the Society's contribution, which, in conjunction with an equal amount subscribed by the Institution of Gas Engineers, has enabled the Government grant of £300 to be obtained. Mr. Albert Cliff, the Chairman of the Section, co-operated with Dr. J. W. Mellor in starting a Refractory Materials Section of the Ceramic Society, which takes the leading experts, investors, and scientists into the principal areas of manufacture, and to a very important extent has already harnessed science to works' practice. The Sub-Committee, working in conjunction with Dr. Mellor, are continuing their work of investigating the manufacture of retorts by casting processes, and good progress is being made.

The Society wishes to accord its best thanks to the Right Hon. Lord Moulton for his valuable services as President. In the office of a Vice-President (which he has been pleased to accept), the Society hopes that it may long have the benefit of his counsel and advice.

The Council have much pleasure in announcing that Sir Arthur Duckham, K.C.B., has accepted the presidency of the Society for the coming year.

In conclusion, the Society feels that it is a matter of great satisfaction and legitimate pride that one of its distinguished Past-Presidents. Sir Dugald Clerk, K.B.E., F.R.S., has again rendered eminent service, not only to the gas industry, but to the whole world, by his illuminating address on National Fuel Economy at the Society of Arts.

The CHAIRMAN moved the adoption of the report. There were, he remarked, many matters in it of great interest. One was the reference to the reconstitution of the National Gas Council, and to the fact that the opportunity was not taken to give the Society the position in that Council which they considered was due to the intimate relations existing between the members of the Society and the whole gas industry. [Hear, hear.] The Council had expressed their belief, and he thought it was well founded, that the time was not far distant when the Society would receive its due recognition. Meantime, of course, they were represented on the Joint Standing Committee of the National Gas Council. He was sure that they were all persuaded that the present was one of the most interesting critical periods in the history of the whole gas industry. He thought he was expressing not only his own opinion, but the opinion of them all, when he said they all felt convinced that the gas industry had a greater future before it to-day than it ever had in the past. They feared no competition that was legitimate. They were convinced that the industry was fitted, and in its own sphere alone fitted, to render incalculable service to the nation. They were determined that in the great housing scheme gas should play its part—a part which the nation would demand. As they knew, in past years, gas had been of enormous service in diminishing the domestic labour of their women folk; and at the present time with the advances that had been made in heating, cooking, and water-heating appliances, they were in a position to render still greater services to the whole nation.

Mr. SAMUEL CUTLER, JUN., seconded the motion, which was unanimously carried.

At this stage, Sir Arthur Duckham, the President-Elect, arrived, and was very cordially greeted.

On the proposition of Mr. R. B. HODGSON, seconded by Mr. JOSEPH TAYLOR, the annual financial statement was adopted.

SECTIONAL CHAIRMAN.

The CHAIRMAN announced the names of the new Chairman of Sections [which will be found in the subsequent complete list of office-bearers], and formally moved that they be elected to serve on the Council as the representatives of the sections for the ensuing twelve months.

Mr. J. W. BROADHEAD seconded the motion, which was unanimously carried.

OTHER OFFICE-BEARERS.

The CHAIRMAN said he had great pleasure in proposing the election as Chairman of the Council for the ensuing twelve months of Mr. Samuel Cutler, jun., Assoc.M.Inst. C.E. The chairmanship of the Council was an important post, as it enabled the occupant to render considerable service to the gas industry. It was a great gratification to them all to realize that, as time went on, the Society met with increasing recognition; and they were fortunate in having as Chairman-elect a gentleman well known to them all as of distinguished ability in his profession.

Mr. J. W. BROADHEAD seconded the motion, which was heartily carried.

Mr. CUTLER, in acknowledging the honour done him, said he fully recognized the heavy responsibility of the position; and being aware only too well of his own shortcomings, he feared there would be some difficulty for him to adequately fill the chair which would be shortly vacated by his friend, Mr. Main. They had just heard the names of the new Council; and he thought he could congratulate himself that he would be well supported. It was a strong Council; and he was sure they would live-up to the important work the Society was born to fulfil. Proceeding, he moved the election of Mr. Cyril G. Davis as Vice-Chairman. Mr. Davis had been connected with the Society, he believed, from its inception. He had evinced the liveliest interest in its doings, and had taken great trouble in looking after their personal comfort and pleasure at their meetings. He had also done a great deal of important work in technical matters. It was only recently that he presented to the Council a very important and well-prepared report upon the quality and composition of gas.

Mr. H. M. THORNTON, in seconding, warmly endorsed Mr. Cutler's remarks.

The motion was carried unanimously.

Mr. DAVIS, in his acknowledgment, promised the Chairman all the support within his power.

On the motion of Mr. CHARLES CLARE, seconded by Mr. JOHN BILBIE, Mr. F. C. Tilley was re-elected Hon. Treasurer; and on the proposition of Mr. GEORGE CLARK, seconded by Alderman F. TEMPLER DEPREE, Mr. B. B. Waller was elected Hon. Secretary.

Moved by Mr. C. CLARE, and seconded by Mr. F. G. COCKEY, Mr. Main was elected an elective member of the Council.

Proposed by Mr. R. SEYMOUR BENSON, and seconded by Mr. R. J. MILBOURNE, Messrs. H. M. Thornton and Percy F. Holmes were re-elected as elective members of the Council.

Messrs. Cash, Stone, & Co. were re-appointed Auditors on the motion of Mr. WALLER, seconded by Mr. JOHN E. WILLIAMS.

LIST OF OFFICE-BEARERS.

Completed, the list of office-bearers is now as follows:

President:

Sir ARTHUR DUCKHAM, K.C.B.

Vice-Presidents:

Sir DUGALD CLERK, K.B.E., F.R.S., CHARLES CLARE, J. H. BALFOUR BROWNE, K.C., D.L., Colonel ARTHUR SMITHELLS, C.M.G., F.R.S., Prof. HAROLD B. DIXON, C.B.E., Ph.D., F.R.S., Surgeon General Sir ALFRED KEOGH, G.C.B., G.C.V.O., the Right Hon. Sir HENRY E. DUKE, Sir ROBERT A. HADFIELD, Bart., F.R.S., the Right Hon. Lord MOULTON, K.C.B., G.B.E., F.R.S.

Council:

Chairman: SAMUEL CUTLER, JUN., A.M.Inst.C.E.

Vice-Chairman: CYRIL G. DAVIS, M.I.Mech.E.

CHARLES S. BENNETT	Representing Section		I.
T. V. MILES	,,	,,	II.
FRED J. WEST	,,	,,	III.
R. J. MILBOURNE, F.C.S. A.M. Inst.C.E.	,,	,,	IV.
F. G. COCKEY	,,	,,	V.
H. JAMES YATES, F.G.S., M.I. Mech.E.	,,	,,	VI.
F. J. GOULD	,,	,,	VII.
A. C. BEAL	,,	,,	VIII.
Sir KENNETH CROSSLEY, Bart.	,,	,,	IX.
G. H. PEARSON PERRY	,,	,,	X.
GEORGE CLARK, M.I.Mech.E.	,,	,,	XI.
J. W. SCOTT	,,	,,	XII.

Elective Members: H. M. Thornton, J.P., M.I.Mech.E., Percy F. Holmes, J.P., M.I.Mech.E., Archibald P. Main.

Ex-Officio Members: B. B. Waller, Assoc.M.Inst.C.E., *Hon. Secretary;* F. C. Tilley, M.I.Mech.E., *Hon. Treasurer.*

Secretary: ARTHUR L. GRIFFITH, 46, Queen Victoria Street, E.C.

VOTES OF THANKS—SUGGESTED GAS-VALVE SECTION.

Mr. R. J. MILBOURNE moved a vote of thanks to the Council for their services during the past year. He remarked that the report showed that the work had been carried out in a most satisfactory manner, and with great advantage to the industry. The Chairman had mentioned the important position in which the Society now stood; and it occurred to him to make a suggestion. Another Society was about to be formed, called the British Valve Association. He thought gas-valves might well form a section of their own Society. This would be preferable to multiplying the meetings one had to attend.

Mr. George Clark, in seconding the motion, and supporting Mr. Milbourne's suggestion, said the Valve-Makers' Association had been practically formed. One realized that gas-valves was a comparatively small trade compared with water, steam, and other valves. The gas-valve was quite distinct from the water-valve; and their interests were not connected in any way.

Mr. Broadhead also thought Mr. Milbourne's suggestion was worthy of the consideration of the Council.

Mr. Cutler promised that the matter should receive careful consideration by the Council. They certainly ought, if possible, to embrace the gas-valve makers in the Society.

The vote was unanimously carried.

The Chairman having made acknowledgment on behalf of the Council, moved a vote of thanks to the officers, and referred to the devoted and conscientious work of the Secretary, Mr. Griffith.

Mr. Hodgson seconded the motion, which was heartily agreed to.

Mr. Griffith briefly acknowledged the vote.

Condition of the Building Industry.

The Chairman said the Council had received a communication from the Royal Institute of British Architects, with reference to a conference on the condition of the building industry. It was to be held on Tuesday, May 20, at No. 9, Conduit Street, at 10.45. The Conference would undoubtedly be one of great importance. The Institute had asked the Society to send two representatives; and the Council had decided to do so. Any member could attend who wished.

A LUNCHEON.

There was a break in the proceedings at this point, and the members lunched together. Subsequently, the toast of "The King" having been honoured,

Mr. W. E. Price (Hampton Wick) submitted the toast of "Prosperity to the Society." He spoke of the greater need that existed to-day than ever before for co-operation. The members of the Society were like the members of the gas industry. They all wanted to go ahead. Gas engineers wanted the manufacturers to help them; and the engineers would help the manufacturers. Great changes had taken place in the industry in relation to the raising of capital and in the position of labour. The relationship between the manufacturers and the industry had also somewhat changed; but he hoped that the former would not attempt to squeeze the latter too far, because even a cow could run dry. They were all sorry Lord Moulton could not be with them that day; but they welcomed the incoming President, Sir Arthur Duckham. He (Mr. Price) was sure he was the right man for the Society at this particular time, and would see the members through. He was glad to see his old friend Mr. Main in the chair, and to learn that his successor was to be Mr. Samuel Cutler, jun., and that the new occupant of the vice-chair was Mr. Cyril Davis.

The Chairman (Mr. Main), in the course of his response, said he was glad the Hon. Secretary of the Institution (Mr. Price) had spoken so freely and candidly on the subject of the closer relationship between the Society and the Institution. One of the things the war had taught them more than anything else was the importance of, in their work, keeping in view the national interest. They had had to undertake work some of them had never done before; and there had been an opening of eyes to this great thing—the national interest. He hoped this spirit would not die-out because the war was over, and that, as the years went on, they would all realize that they were, after all, out for the interests of the Empire and the nation. The Council had stated in the report that they looked forward to the time when the Society would form an integral part of the gas industry, and be recognized as such. They wished to meet together, and discuss matters of common interest; but they did not desire to interfere in matters that were not of common interest. He thanked Mr. Price, on behalf of the Society, for his good wishes, and for the hearty way in which the visitors had honoured the toast.

Sir Arthur Duckham, in proposing the toast of "The Visitors," remarked that the visitors that day were composed of what they themselves called the gas industry, but which he called part of the industry, and their friends of the Press. Neither of these appreciated the Society so much as they should do; but the Society themselves must get into closer touch, and show their friends what good people the members of the Society were, and how much more was to be made of them. As Mr. Main had said, the members of the Society felt they ought to be more closely attached to the gas industry. The fault was partly the Society's own. The members were far too modest. They did not appreciate their strength; and, if he might say so, they did not appreciate their brains sufficiently. He had been on both sides of the fence; and he did not feel he had come down to a lower level of brain power in coming on their side of the fence than when he was on the other. They were very lucky in having a man as President of the Institution of the breadth of mind of Mr. Glover, who had been of the greatest assistance to the Society, because he had done everything he could to help them forward. And Sir Dugald Clerk, who was to be the new President of the Institution, would be of the greatest assistance to that body, and incidentally to the Society, because he clearly understood what was (if he might put it this way) for the general good of the whole industry. What was wanted, especially at this time, was to bring the knowledge that each one had to the benefit of all. He coupled with the toast the name of Mr. Glover.

Mr. Samuel Glover (President of the Institution of Gas Engineers), in the course of his response, said he saw round the tables many men whom for a very long time he had known, honoured, and loved for their work's sake. That might seem a large claim for a man so young as himself [Laughter]; but the fact remained that, in this month of May he entered upon his forty-ninth year of connection with the industry. From a position in a gas company (which was afterwards bought by the corporation) his association had been, strange to say as official and adviser to the Gas Department, always in the same place. He thanked Sir Arthur for the kind words he had spoken of him. He had tried to be of use to the industry as a whole. He had been to many meetings of the Society, and had always been interested. He was sorry Lord Moulton was not present. On this occasion, he felt there would a link missing if he were not present; seeing that his predecessor in the chair of the Institution was Lord Moulton, who was their President, and was to be succeeded by Sir Arthur Duckham, while Sir Dugald Clerk, who had kindly consented to follow him in the presidency of the Institution, was also present. He congratulated the members of the Society upon the way in which they had filled up the period of the long drawn-out war, by rendering service to their country through their ability and the use of their works to turn out material for winning the war. In this they had much inspiration from Sir Arthur Duckham all the time. The work of the future would also be very arduous; but the members of the Institution knew that the members of the Society would rise to the occasion, and would meet the demands made upon them. He was disappointed that a paper from the manufacturing side of the industry had not been arranged for to be presented at the forthcoming meeting of the Institution. In conclusion, he wished them all prosperity.

The Chairman remarked that, if the invitation was extended to them to read a paper before the Institution next year, the Society would gladly accept the opportunity. Proceeding, he proposed the "Health of Sir Dugald Clerk," who had rendered valuable service to the industry, and who was affectionately known to everyone of them.

Sir Dugald Clerk, in the course of his response, reminded those present of the paper he read before the old Gas Institute at the Southampton meeting in 1902. The paper was on the large gas-engine, and the gas used by them; and then he distinctly said the time would come, owing to the development of the incandescent mantle, when the illuminating power of gas would be a matter of no moment, and the real measure of the efficiency of gas production would be thermal value. Many of his gas-engine friends then thought this a hazardous prediction; but he now found his friend Sir George Beilby had produced a report in which he actually proposed this should be done. He had had the honour of being the first President of the Society of British Gas Industries; and he believed he was almost the inventor of the idea that it was a proper thing that the same man should be President of both the Society and the Institution. He felt there was a very artificial line of division between the two—that they were both equally interested in the gas industry, and prosperity depended very largely upon both. Notwithstanding all the great ambitions of their electrical friends, the gas industry had an enormous field before it. It was, however, not only necessary to attain to high efficiencies of production, but to high efficiencies of the apparatus in which it was consumed. Manufacturers, like Mr. Main, had quite an interesting task before them.

PATENTS AND THE WAR—EMPOYERS' LIABILITY AND WAGES—COAL, LABOUR, AND OTHER TOPICS.

The sitting was resumed in the afternoon; but there was disappointment over the unavoidable absence of the President, Lord Moulton. The Chairman (Mr. A. P. Main) again presided.

An Explanation.

The Secretary (Mr. Arthur L. Griffith) said he had an explanation to make which had been left in his hands by Lord Moulton's Secretary (Mr. A. Bazire). Lord Moulton had hoped to be with them that day; and they had looked forward to the delivery of his Presidential Address. He was, however, called away to the Peace Conference some three weeks ago; and his departure from Paris in time for the meeting might become a matter of practical impossibility. He had telephoned through asking the members to excuse his absence. He also trusted that they would, at some later period, allow him to deliver his Presidential Address. Letters of apology for absence had also been received from Sir Alfred Keogh, Lord Justice Duke, Prof. Arthur Smithells, Prof. Harold Dixon, Mr. D. Milne Watson (who was also in Paris), Mr. W. Cash, Mr. F. W. Goodenough, and Mr. W. M. Mason.

Patent Extension and Employers' Liability.

The Chairman said they all greatly regretted the absence of their President who was engaged at the Peace Conference. The President was to have delivered his Presidential Address; but he thought they could profitably employ the time they had in consequence to spare. At their council meeting that morning Mr. F. C. Tilley raised two important questions; and he knew the members would be glad to hear the opinions on these subjects of Sir Dugald Clerk and Mr. Balfour Browne. The first point was that of patents. Mr. Tilley pointed out that, owing to the war, patents which had been taken out just on the eve of the war had been practically held in abeyance for the last four years, while the fees had been paid. He (the Chairman) understood that the Government proposed to give an extension of four years to compensate, but without allowing any rebate—that was to say, the extension gained would have to be paid for. The second question was one under the Employers' Liability Act. Premiums were paid to the Insurance Companies on the amount of the wages. And it was notorious to them all that a man who, before the war, was earning £2 a week was now earning £4 or £5; so the Insurance Companies were receiving more than double their income under the Act, while they only gave an advance of 25 p.ct. to men who were injured. It was thought by the Council that some representation should be made to the Government or the Board of Trade, so that possibly the matter might be raised in the House of Commons. On these subjects they would be glad to get the opinions of two of their distinguished Vice-Presidents.

The Patent Question.

Sir Dugald Clerk said the question of patents was a very important one, and it was also one of considerable difficulty. He

had had a good deal of experience in the Law Courts in connection with inventions in one way or another, and one could not help seeing that though some inventors had suffered during the war, quite a large number of other inventors had gained. As the members knew, a Special Committee was now sitting to determine the remuneration that should be paid to inventors for the use of inventions which had been of value during the war. He could mention many for which the inventors had been paid large sums, solely because of the war. The consequence was that one could not altogether blame the Government for some little hesitation in the matter. But he understood it was now settled. All of them interested in patents hoped to get them extended for a term of five years; and he believed the term was to be so extended. And, after all, the payment of a renewal fee was not a great matter. It was really a very small consideration, and much like another question in which he had been concerned. He happened to have been sitting on a Committee in connection with utilizing the Empire's water power. Some people had an exalted notion of the cost of power in proportion to the total costs of a works. In America, it had been shown that it varied only 3 to 6 per cent. of the total cost. In the same way, inventions were not a large proportion of a business. He thought the Government should deal generously with an inventor; but at the same time, one need not get too sentimental over the poor inventors. Those who were poor deserved to be poor, because they were men who had had ideas which had proved to be impracticable, and they were merely running after a shadow. In connection with the Ministry of Munitions Department, they had about 30,000 inventions thrown at their heads for examination; and there were only about 100 real inventions in the whole lot. A new invention was a very rare thing. He quite agreed with Mr. Main that an inventor should have an extended term; and he thought that the arrangement that had been made was quite satisfactory. So far as the other matter was concerned, Mr. Balfour Browne was more competent to discuss it than he himself was.

A Criticism of the Coal Commission.—Industrial Control by Workers.

Mr. BALFOUR BROWNE, K.C., said he noticed in the report of the Council that mention was made of the various honours that had been conferred by the King upon certain members of the Society for work they had done during the war. They had, however, not mentioned the honour which had been conferred not by the King, but by trade upon their late President, Lord Moulton, who had been made Chairman of the important Company which was to reorganize the dye industry in this country, and put it on its feet, and enable it, if it possibly could, to prevent the "peaceful penetration" which took place and undermined some of the industries before the war. They were all sorry that Lord Moulton was not there that day. He was a great lawyer and a great scientist; and doubly he was connected with trade by having been the President of this Society, and now with the Company of which he was Chairman. But speaking of trade generally—not of the particular matters Mr. Main had referred to, which were most important (patents and employers' liability, which, of course, in the aspects mentioned, were both clear injustice)—some of them had been reading, and Sir Arthur Duckham had been hearing, the evidence which had already been given before that very curious and interesting Commission called the Coal Industry Commission. [Laughter.] This Commission was appointed to inquire into and settle the question of hours and wages as between the Government and the miners; and, like that overrated Solomon, they split the child in two, and gave exactly half-way between what the Government had offered and the miners had asked. It was a diagonal of the parallelogram of forces—half-way between. [Laughter.] Not content with this, before they had heard any evidence, the report said that several of their members were entirely decided upon nationalization. Now they were apparently hearing evidence, which seemed to him like putting the cart before the horse. But the whole trend of the inquiry, as he understood it, was one which applied to the very roots of the industrial conditions of the country. The miners were not going to be content, whatever the minority of the Commission might say, with merely the nationalization of the mines in this country. They were out for the management of the industry by the workers; and this was a question which it seemed to him the Society ought very seriously to consider. One member said he was in a peculiar position because he was also a Commissioner; and he gave evidence. He (Mr. Balfour Browne) supposed he would report—possibly it would be a minority report—on his own evidence. That member said the profit system in this country was corrupt and low; and ought to be got rid of as far as possible; and, being in the peculiar unpartial position of both witness and judge, he said that it made him passionately angry that the people of this country were so perverted by the profit system. This was the system on which every one of their industries was at the present time running; and if the profit system was to be done away with, then the whole system of industry in this country would clearly be undermined. Not only this, but they all knew and must face it, that the miners were now out not only for doing away with the profit system, but for the whole control of industry. What they said was: "You, the Government, must find the money for the purchase of the mines, and we, the men, are to control them." This was not only an economic question but it was a great political question. They would shift the power of the country, if this took place, from the hands of Parliament into the hands of the workers. "If," said the speaker, "you allow the workers of this country to manage the whole of the industries—your industries among the rest—you give them the power to control the whole country." They must not suppose this was merely an inquiry into the mines, as it referred to every industry in the country. Every one of the industries connected with the Society was run upon the profit principle. He personally did not see why, if the profit principle was to be done away with in the case of mines, it should not be done away with in the cases of textiles, iron and steel, shipping, gas, and other industries. It would not do for the British gas industries to stand aloof, and let the miners fight this question of nationalization by themselves. "It affects you." For his sins in the past, and his idleness in the present, the Federation of British Industries had made him, for the time being, the Chairman of the Railway and Transport Committee; and in this connection he had been considering, with the assistance of the various members of the Committee, the whole question of transport in this country which had been raised, and raised in a very drastic form, in Sir Eric Geddes's Bill. Was the Society affiliated with the Federation of British Industries? He believed that, though several of the members of the Society were members of the Federation, the Society itself was not federated. He asked whether it was not well the Society should be affiliated with the Federation, and assist in swamping this tide, which was a tide that was going to sweep away capitalism, and put democratic control in its place. Many important questions had been discussed earlier in the day; but he was bound to say that the important question for all the Society's members to consider was the one he had submitted. He apologized for having submitted it. With all the optimism they had heard earlier in the day, his pessimism might seem very bad. At the same time, his heart was with the Society; and he must say they should make a stand, and that stand must be now.

Induction of the New President, Sir Arthur Duckham.

The CHAIRMAN said the members were much obliged to Sir Dugald Clerk and Mr. Balfour Browne for the valuable words they had addressed to them; and they might rely upon their opinions having the very careful consideration of the Society of British Gas Industries in the near future. They had now arrived at the time when, according to the programme, they had to instal their new President, Sir Arthur Duckham. He was not going to take up time by saying anything further, which was needless. Sir Arthur Duckham's qualifications for the highly honourable position to which he was now called, were known to all the members; and he (the Chairman) should content himself with installing him as their President for the coming year.

Get Together, and Unite Forces.

Sir ARTHUR DUCKHAM (who on rising was enthusiastically greeted) said he had not prepared anything to say to the members that day, because he had expected they would have had an interesting address from Lord Moulton. He had thought that, when this part of the programme had been reached, the afternoon would have been so far spent that he would have just had to say "Thank you." But he wanted to impress upon the members how greatly he felt the honour they had bestowed upon him. He felt the honour more than anything else because he was one of themselves. He was a gas man by training. As he had often told his wife when he went home late, "We live by gas, we eat by gas, and we sleep by gas." He was proud to say that all the work of his life had been in connection with the gas industry; and it had not been difficult to resist temptation to branch away from the gas industry for the remainder of his life. Such temptation had come his way since he had, of late, been working with the Ministry of Munitions. Mr. Balfour Browne had referred to the Coal Commission, and to its importance to the industry as the members represented it, and to the industry as Mr. Samuel Glover had represented it. He (Sir Arthur) quite appreciated this; and it was only because he appreciated it that he was on the Coal Commission. They could understand what a tie the Commission was to one when it sat every day, and the absolute waste of time when they heard theorists such as Mr. Sidney Webb and Sir Leo Chiozza Money cross-examining witnesses in theory and not practically in any way. He (Sir Arthur) trusted he might represent to a certain extent the interests of gas industry on the Commission, and especially the interests of the consumer. A word with regard to what Mr. Balfour Browne said about the first report. He (Sir Arthur) was one of those who signed it. They all agreed, and unanimously agreed, that the present condition of affairs was wrong. This was agreed even by the mine owners' representatives. The people who signed the report, which was accepted by the Government, were the Chairman (Mr. Justice Sankey), Mr. Arthur Balfour, of Sheffield (whom they all realized as a trader of some considerable standing), Sir Thomas Royden (one of the ablest commercial men in the country), and himself. The reason mention was made in the report about a change in the present conditions was because they found the present conditions were wrong, and they knew that unless some settlement was made that would present a change in the existing conditions, the possibility of a strike of the miners and transport and railway workers would have become an absolute fact. They therefore felt that they were called upon to make a preliminary statement. The great difficulty of having to report in such a short time would be understood. But the greatest difficulty was, he thought, the weakness of industry—that was, the weakness that people of the industry did not get together, and make concerted plans of what

they wanted for the industry. He had mentioned this on several occasions. They knew the mine owners had a scheme for the improvement and control of the management of the mines and the treatment of the workers. But they could not get this produced by the mine owners; they would not agree to put forward any scheme at all. This was the difficulty in industry; it was the difficulty they had to get over. He felt this was one of the great reasons for the Society; they did get together, and got concerted opinions and action. But the remark had been made during the proceedings that the gas industry had been badly used throughout the war. The gas industry rendered greater service during the war than any other industry in the country. Still the gas industry had been worse treated during the war than any other. Look at the way gas companies had been treated under the sliding scale! Other trades and industries, especially their friends of the electrical industry, had received better terms—the reasons being that they got better concerted action. This was one of the great troubles at the present time with the mining industry. There was something wrong; and they had got to do something better. Mr. Balfour Browne, in his speech, mentioned the subject of the workmen managing the mines. To his mind, the Coal Commission was very badly reported indeed in the Daily Press. A little bit of smart repartee made by Mr. Webb or a domestic or homely remark dropped by Mr. Smillie was found in the papers, though it had no effect on the work of the Committee. He had cross-examined Mr. Cole, a protagonist of syndicalism. He asked him how he would run works with a manager controlled by a committee? What would happen (say) if there was a fall of roof, and the manager said some action had to be taken to protect the lives of the workmen. Would he have to take the matter to a committee to see whether it should be done? Mr. Cole replied "No; the manager would have the right to settle such a thing." [Sir Arthur gave other illustrations.] The answers led him to put it to Mr. Cole that the mine manager would be as the captain of a ship, and what he said would have to be done would be done. Mr. Cole agreed. This was an absolute holdfast in his evidence; but it did not come out in the report he (Sir Arthur) saw at the time. A rather interesting thing that he asked Mr. Cole was whether he had ever been a workman, or had control of workmen, or had been a manager in charge of a business. His reply was: "No; thank God." It was through the incorrect and indifferent reporting in the Daily Press that they had these false impressions throughout the country.

DUE RECOGNITION OF THE SERVICES OF THE SOCIETY TO THE INDUSTRY.

Now a few words about the Society. He could promise the members that any time he had available he would place absolutely at the disposal of the Society. It had a magnificent council—one of the strongest councils he could imagine; and he thought they ought to do great things in the future. They had done great things in the past; and with the incentive of the past, they ought to have a great future. He believed the time was not far distant when the Society would receive recognition of its services to the industry. His opinion was very definite. He personally could not see how the National Gas Council could get on without the Society, because, after all, the members of the latter naturally—he was sure Mr. Glover would excuse him—had in a way more initiative than the gas engineer. They had greater freedom of action; they were "bosses" of their own businesses. With all due respect to the President of the Institution, Mr. Glover was not the "boss" of his business. He had something to prevent him—something that held him back when he wanted to go forward. The members of the Society in their businesses could go forward by just saying "Yes" or "No" themselves. The Society could be of incalculable help to the industry if they could get together, and put their backs into the questions that arose. As to the proposal that a paper from the Society should be read before the Institution of Gas Engineers, he was absolutely in agreement with the Chairman that now was not a proper time to put forward a paper; and he felt they should not submit a paper unless it was of their very best. The paper should transcend any paper coming from any gas engineer, because the members of the Society had greater opportunities for preparing a paper, and the paper must be something of which they would be particularly proud, and not only just good enough. He hoped, when they did present a paper to the Institution, it would be absolutely first-class—not prepared by any one member of the Society, but by the body of members putting together their best brains. Take the case of a gasholder. Their friend, Mr. Cutler, did not wish to put forward his own ideas on holder construction only, but he would like to combine his with those of the other builders of holders. He was certain they were broad-minded enough men to come together and pool their knowledge for the benefit of the industry. This was a thing he felt stronger than anything else. All his life he had been very strong on the question of "casting your bread upon the waters." Personally, he liked to give away ideas, because it made him "buck-up," and get some fresh ones. But a man who got an idea, and sat on it, he would go to the dogs anyhow. If they could pool their knowledge, and get better business by so doing, they could give better value and service to the industry, which would be to their own advantage.

THRESHOLD OF A GREAT DEVELOPMENT IN GAS.

Another point in which he was interested was that they were to-day on the threshold of an entirely new and great development in the gas industry. He had been discussing with his friend, Sir Dugald Clerk, the question of gas and electricity. Sir George Beilby had been thinking-out for the Government the question of testing; and it was one that required a lot of thinking-out, because the method of testing gas was a very improper one both from the suppliers' and the consumers' points of view. They were on the development just now of a great deal of liberty in gas. Let them look at what this meant. It altered entirely their preconceived ideas as to the carbonization of coal. It altered very largely the preconceived ideas of the apparatus on gas-works for dealing with the gas made, because all the way through the designers had had before them the conservation of the candle power of the gas. When this was done, a great deal more liberty was given to the designer of gas apparatus. They could consider the direct recovery of ammonia without the fear of the candle-power being reduced, and so on. The greatest chance of development was to the makers of the various appliances for consuming the gas. They would have a different and much easier gas with which to deal; and there would be a great deal more of it used. Take in a normal way the efficiency of gas apparatus such as was used in a town. Take his own house; he was ashamed of the gas apparatus there. The gas-oven burners had five times too much air, and no means of regulation. He had never seen anything so vile in his life as the gas-geyser that was fitted in the house [Laughter.]; and there were gas-burners there which gave trouble all the time. That gas engineers and gas undertakings were satisfied with this absolute rubbish was a matter of astonishment to him. There was a tremendous field and scope if they got to a standard of calorific power, a standard of inerts, or (as he would prefer to see) a standard of specific gravity. This would make it easier for the gas-appliance manufacturers. He would make it a matter of responsibility upon the gas undertakings to see that the apparatus in their districts was properly looked after. He should like to be able to go and get his gas company fined for not looking after his apparatus. [Laughter.] There was a great future for them; and they were only just at the beginning. He was at a meeting the other day; and somebody remarked about carbonizing. He (Sir Arthur) observed—and Dr. Carpenter agreed—that they were only just beginning to learn about carbonizing. Perhaps the burning of gas was rather an easier thing to get to the bed-rock of, though the thing that was worst looked after.

AN INDUSTRIAL IDEAL.

As to the question of tying-up the electrical undertakings to the Ministry of Ways and Communications, he had several times endeavoured to use any influence that he might have in preventing this occurring. It seemed to him they had got to a period now when they had to look upon this question of fuel and fuel conservation as entirely a national question. He did not want to see these things nationalized, and he was certain the benefits of nationalization could be obtained by private ownership provided the private owners got together and gave the whole of the benefits which might accrue from nationalization. A proper costing system, a proper interchange of ideas, the collection of statistics, and the benefit of one helping the other all the way through, were matters of fruitful importance. In the case of the coal mines, it was said that great benefits would accrue, as the better would be able to help the worse. Uniformity of practice in working, and uniformity for selling coal, would result. All these things could be done if they all pulled together as private enterprises, and all of them worked for the one good. The better his competitors did, the better he had to do, or else go under. Take the case of the workman's conditions. It was a perfectly right and proper thing that the workman should feel he had a definite interest in the control of the works. This thing he knew was appreciated to the full. He (Sir Arthur) was a director of a company where the works were run with a works committee. The manager was "boss;" and there was a works committee of the men. They were at liberty to discuss anything on the works. In two-and-a-half years he had never known a resolution to be passed by them which had not been accepted by the management or the board of directors. Work went on with the greatest harmony. There was a profit-sharing scheme. On one occasion some fitters went out on strike, and the works committee docked them of their bonus, and put it to the sick benefit fund. The management would not have dared to do that. There they had an instance of the benefit of bringing men to take an interest in the conduct of the works; and the men appreciated it. Reverting to the electricity business, what he felt that they wanted in this country was not electricity plant by itself, but they wanted to make use in the most efficient way of the whole of the fuel raised in the country, because with the high price of coal householders could not afford to waste it. But there was a large percentage of coal which was very wastefully used; and it seemed to him that, instead of the Government appointing Electricity Commissioners, and putting them under the railways which only used a small proportion of the coal raised, what they really wanted were Light and Power Commissioners, who would be the co-ordinating link between the fuel industries. They would in this way take an interest in gas-works, and see they were efficiently run. The same with electricity stations, coke-ovens, blast-furnaces, and boilers. When they thought of an average amount of 5 lbs. of coal per horse-power-hour, it was absolutely wicked that valuable fuel should be going to waste in this way. The distribution of gas and electricity should be considered together. The point that people did not appreciate—a point Sir Dugald Clerk had put forward so ably—was that for the distribution of heat units, electricity was not in it. Those

people did not talk of heat; they talked of power. He should like to see this point urged very strongly by the Society and by the Institution of Gas Engineers. They would get strong support, because it seemed to him only commonsense. He looked forward to great prosperity for their Society; and he would promise all the assistance he could give. He felt the sections should do better work; and he trusted they would carry out the idea of the scheme he felt to be necessary of pooling ideas, assisting each other, and doing their best as an institution.

THE WINNER OF SIR ROBERT HADFIELD'S PRIZE.

The SECRETARY said it would be remembered that Sir Robert Hadfield, one of their Past-Presidents, offered two prizes—the first of £100, and the second of £50—for the best essay or invention by employees of members of the Society. There were not a large number of competitors. This, no doubt, was owing to the war. The essays had been carefully examined by the Committee; and the result was that it had been decided to award the first prize to Mr. F. W. Epworth, of the technical staff of the Richmond Gas Stove and Meter Company, for an important essay on the "Utilization of Gaseous Fuel in Commercial Practice, with Considerations of the Types of Gas-Fired Furnaces and Methods of their Control." Sir Robert Hadfield, who had been through the paper, was highly pleased with it; and he had decided to award £100 to Mr. Epworth. Unfortunately, there was no essay or invention worth the second prize.

This concluded the proceedings.

Germany and the Chemical Industry of America.

In a long report which was issued by him some weeks ago, Mr. A. M. Palmer, the Alien Property Custodian in the United States, says that in the early part of the present year practically all known enemy alien property in the country had been seized; and its total value was approximately $700,000,000. The report contains a lengthy chapter on the chemical industry; it being remarked that the complexity of the manufacture of dyestuffs as a business proposition is almost beyond belief. Tens of thousands of distinct dyes were produced in the German factories, and over 900 of these were actually sold in appreciable quantities in the American market alone before the war. When the war came, the German patents formed a colossal obstacle to the development of the American dyestuff industry; but on consideration it was agreed that these patents offered a possible solution for the problem, hitherto unsolvable, of protecting the new American dye industry against any German competition after the war, while the placing of the German patents in the hands of an American institution strong enough to protect them would free the American industry from the prohibition enforced by the patents against the manufacture of the most valuable dyestuffs. The result has been the formation of the Chemical Foundation, in which practically every important American manufacturer will be a stockholder. The object is to acquire the German patents by purchase, and to hold them as a trustee for American industry. The Company has been capitalized at $500,000; and the Custodian has sold to the Company for one-half this amount approximately 4500 patents, the other half being retained for the prosecution of infringement proceedings. It is urged that at the very least the Company will be able to protect the American industry for a considerable period.

Future of Nitrogen Fixation Processes

The present status of nitrogen fixation was considered by Lieutenant-Colonel A. H. White in an address which he delivered at the Chicago meeting of the American Institute of Chemical Engineers; and he also devoted some remarks to the future of the industry, which, he said, can be forecasted only in the most general manner. It depends upon two factors—the demand for fixed nitrogen, and its price. The greatest demand in the future will probably be for fertilizers; and the use of fertilizers will be very largely a matter of price. The cheapest source of fixed inorganic nitrogen will undoubtedly be the ammonia from bye-product coke-ovens, because it is a bye-product, and the cost of collecting and putting it into marketable form is small. The coke-ovens of the world can now produce more fixed nitrogen than the world used from all sources ten years ago. This will be a powerful factor tending towards lower prices. He thinks that it is highly probable that Chilian nitrate could, if necessary, be sold at lower prices than in former years. The fixation processes will therefore have to be prepared in order to meet possible low prices, if they are to be ranked as anything more than emergency reliances. A process which is to produce a large proportion of the world's fixed nitrogen, must be able to compete with the staple materials, sodium nitrate and ammonium sulphate. The cyanamide and arc processes both labour under the handicap of the requirement of large amounts of electrical power. The nitride process has a somewhat similar handicap, but possesses a possible advantage in the recovery of alumina as a bye-product. The cyanide process labours at present under the disadvantage of small manufacturing units, but has the advantage of low power requirements and the possible recovery of formates as bye-products. The direct synthetic ammonia process presents great engineering and chemical difficulties, but has large possibilities of future development. If an inventor could find a catalyst active at 300° C., it would offer the possibility of cheaper fixed nitrogen than anything heretofore known.

RESEARCH BUREAU FOR THE GAS INDUSTRY.

The new business department—and, in fact, nearly all other departments in the organization of a gas enterprise—must, declared Mr. F. M. Lester, in a paper which he read before the Illinois Gas Association, revolve around a Research Bureau; and it must be a research bureau thoroughly equipped for the efficient performance of its duty, which will be to ascertain what the gas industry is doing, how it is being done, and what is being left undone. It must find out what is in the gas, and what is there that is not needed. The research bureau must ascertain how any not-needed material may be taken out of the gas, and how it may be diverted to a legitimate use. If this use does not exist in the shape of a concrete demand, then the research bureau must show how a market may be created.

The author feels that the innovation of the research bureau cannot fail to bring about changes in all details of the new business department—that is, the department engaged in making sales. There will not be an abandonment of the policy of seeking business through advertising, but rather an infusion of more energy into it. There will also be an increase of care in the cultivation of friendly relationship with customers on the mains and in the sales-rooms. People in this department will find out that they have new problems to contemplate.

It is possible, Mr. Lester thinks, that no great market was ever opened with less friction and more ease than has been the case with the market for industrial gas. To secure its adoption, it has hardly been more than necessary to demonstrate, on a small scale, the extraordinary adaptability of gas, its efficiency as a fuel, and its ease of control. But if the operation of marketing gas for fuel in the industries is now sufficiently developed to have furnished observant men engaged in the industry with an acquaintance with safe methods of procedure, the market for gas bye-products is, on the contrary, largely an unknown domain. "When your research bureau shall have discovered that you can produce a useful something, shall have told you how to do it, and shall have taught you where that something may be put to use, the research bureau is in pretty much the same position as your advertising department. If the latter can get its advertisements read, that's about as far as it can go. The rest of the job is up to somebody else, and likewise, when the research bureau has told you all it has learned about the goods and the vent for them, the buck is passed to the salesman." This salesman will have to meet competition—quite probably stiff competition—of a sort practically unknown in his original company environment. There is little or nothing in the experience gained in the new business department of the average gas company as it was a few years ago and as it is now in many individual cases, to which reference can be made for specific assistance. He will encounter doubt and must overcome it. He will have to turn indifference into interest; and he will have to do a lot of other things besides.

Mr. Lester concluded his paper by remarking that the changes pointed out by him are not the only ones that must come in the new business department in its relation to the research bureau, which, too, must come in the new order. Their definite outlines work themselves out of the high lights in which is depicted the gas plant of the not distant future—a factory wherein there is a minimum of waste, whose products are multiplied and multiplying, whose markets are not confined, whose financial solidity is strengthened by the very variety of its work. Whatsoever there is to be done is an equation, and in it the individual human factor is the determining factor. And he has full faith that out of the industry's own organizations will come the men the new order demands.

Determining Sulphur in Coal.

Mr. S. W. Parr, of the University of Illinois, contributed to the "Journal of Industrial and Engineering Chemistry" a description of a fusion bomb for sulphur determination in coal. The determination of sulphur in coal by the use of sodium peroxide as an oxidizing medium has, he says, met with favour wherever it has been tried. The need of a suitable device to carry out the combustion has been evident for some time. In the simple piece of apparatus for the purpose which Mr. Parr describes, a fusion cup has a cover, which is held in its place by a screw cap. The cup is removable; and by having duplicate cups, a number of samples may be made ready at the same time. The charge consists of 0·5 gram of coal, with from 9 to 10 grams of sodium peroxide. The materials, after being sealed within the holder, are thoroughly mixed by shaking. Ignition is effected by holding the bottom of the cup for a moment in the flame of a Méker burner, or by allowing a jet from a blast lamp to play upon the cup. After ignition, the cup is removed from contact with the flame. In less than half-a-minute combustion is complete. When the cup has been cooled under the tap, it is removed from the holder and placed on its side in a beaker of about 200 c.c. capacity. Solution of the fusion is complete in a few minutes, when the cup may be removed, rinsed, and dried, and is then ready for another charge.

Mr. Clement Tildesley, the late Chairman of the Willenhall Gas Company, left estate of the gross value of £47,210.

Official figures show that the production of coke in Belgium for 1913 was 3,523,000 tons, in 1914 2,001,670 tons, and in 1918 522,210 tons.

MORE "B.C.G.A." DISTRICT CONFERENCES.

Gatherings at Cardiff and Derby.

The Reading and Sunderland District Business Conferences of the British Commercial Gas Association which were reported in last week's issue of the "Journal" have since been followed by others at Cardiff and Derby, at which Mr. F. W. Goodenough (the Chairman of the Executive Committee), and Mr. W. M. Mason (the Secretary) were ably assisted in the continuation of their excellent propaganda work.

THE MEETING AT CARDIFF.

The Cardiff conference, held last Wednesday afternoon in the Whitehall Rooms at the Park Hotel, was presided over by Mr. C. E. Dovey, J.P., the Chairman of the Cardiff Gas Company. It had been arranged to follow the morning session of the Wales and Monmouthshire District Institution of Gas Engineers and Managers. Thus the large and representative audience included quite a number of gas managers.

The Chairman's Welcome.

The Chairman (Mr. C. E. Dovey), in welcoming those present, remarked that the Association possessed elements capable of achieving great results in the interests of the gas industry. It was an old industry, and was governed by obsolete Acts of Parliament. These Acts should be relegated to the past, and new ones put in their place, in order to bring the gas industry more into harmony with modern requirements. This legislation should be of such a character as to enable them to secure fair treatment. He did unhesitatingly say that the industry had been dealt with very shabbily by the Government. They had suffered in many ways through the war; and as commercial undertakings they were thought to be adequately rewarded by the payment of a reduced dividend. The injustice of the thing must be patent to them all. Surely, the fact that they carbonized over 20 million tons of coal a year was in itself an element indicative of the importance of the industry. Railways were controlled; but their dividends were preserved from pre-war days. What possible excuse could there be for not putting gas undertakings on the same terms? The British Commercial Gas Association set out to improve the position of the industry; and he did urge upon them the importance of making every effort in their power to put before the governing body of the country the justice of the industry's case. But while they did this, they must not forget that it was incumbent upon them to go in for research work. He did not believe himself that they had reached the end of their resources; but it was necessary not to overtax the existing officials of gas undertakings, who had passed through a great strain. He should say that there ought to be employed practical men who would devote their energies to scientific research, keeping in touch, of course, with the administrating branches of gas undertakings. He could not help thinking that there was a good deal yet to come from developments—perhaps in the near future. When first he saw the vertical retorts, which gave such extraordinary results, the thought passed through his mind, "What has happened in the gas industry that this idea has not been worked out before?" It seemed to be such a simple thing. Then came the question of steaming. Of course, horizontal retorts had their charm; and he did not think they had reached the end of the successes that were going to attend them. In London, they had the discernment to spot ability when it came before them, and had put on the Executive Mr. George Clarry. He could not help thinking they did a very wise thing, because his life had been spent in the gas industry. He cordially welcomed Mr. Goodenough, who was paying his first visit to Cardiff, and was charmed with the city. He was sure he would be charmed also with the activity of the local branch of the Association.

MR. CLARRY'S OPENING ADDRESS.

Mr. George Clarry, the Secretary and General Manager of the Cardiff Gas Company, then delivered the following opening address:

The assemblage to-day at Cardiff of members and supporters of our Association is an honour which we appreciate very highly; this being the first District Conference held since the war. We recollect that on a former occasion our good friends at Newport entertained the conference; and their efforts largely contributed to its unqualified success.

May I interpose a word upon the loss which Newport has sustained by the death of their Engineer-Director, Mr. Thomas Canning, and to say how much we in this district valued his sterling good qualities. Mr. Canning was a Vice-President of the Association, and we were proud to have his name associated with the "B.C.G.A."

The Association has done most valuable work during the war—in fact, the remarkable feature has been its adaptability to constantly changing circumstances, and its complete mastery of detail under difficult and varying conditions. The credit for this really excellent record is due first and foremost to the Chairman of the Executive, Mr. Goodenough, whose presence here to-day we welcome as an assurance of his continued interest in the organization, together with that of the able and genial Secretary, Mr. Mason. Mr. Goodenough is an outstanding personality in the gas industry—the originator of the Association, and its best friend. No institution has deserved our hearty and practical support more than the familiar B.C.G.A.; and we in this district of Wales and Monmouthshire offer to the Association, and Mr. Goodenough in particular, a warm and—shall I say—brotherly welcome. It may interest him to know that members here are just as keen and anxious to progress in the gentle art of salesmanship as those in any other part of the country.

Wales and Monmouthshire District.

Our district covers a wide area, with a very scattered population, except here in the south, where there is a vast industrial population. The county of Glamorgan has no less than one million people; this being a greater number than all the rest of Wales put together. Monmouthshire, with which we are happily associated, has over half a million inhabitants. Consequently, we, in this locality, represent two thirds of the total population. These facts, while indicative of our commercial and industrial activity, point very clearly to the necessity of keeping abreast with the material development and well-being of the great mass of workers by the provision of suitable housing accommodation, which in many parts is shown to be an urgent and pressing necessity.

The Wales and Monmouthshire district contains about 100 towns and villages possessing a gas supply. These range from the tiny works producing 2 million c.ft. per annum to its large neighbour sending out 7 millions per day in the busy season. The total capital represented by these undertakings is about 2¼ millions sterling, with more than 200,000 consumer . These figures may not appear large when contrasted with the very populous areas such as may be found in the Midlands; but as units in a great army, each one is a centre from which radiates potential power and general service to the inhabitants. It is rather in relation to their individual usefulness than in a collective capacity that the scope and service represented by gas undertakings appeals to the public; and our connection with the B.C.G.A. is founded upon their well-known principles, which aim at perfection of detail and constant effort to meet all demands. To paraphrase an old saying, "Take care of the units and the millions will take care of themselves." Our object therefore is to see that every consumer gets satisfaction; and the object of the B.C.G.A. is to tell us how this satisfaction may be secured.

The General Outlook.

Let us look around and consider under what conditions we meet; for I am sure you will agree the times are exceptional and difficult. The vagaries of our climate, its alternations between bitter cold and muggy warmth, its days of dull and depressing deluge, make a large demand upon the health and vitality of young and old. Our household fuel supplies are restricted, and our domestic helpers forsake the hearth for the unemployment bureau. Food is dear, and none too plentiful. We want something to give comfort and relief in sickness, warmth in our rooms, easy cooking facilities, with a reduction of household drudgery.

True, the weather, like the poor, is always with us. But the other conditions are no doubt due to post-war considerations; and he would indeed be a born optimist who could predict an early relief. Add to this the desire for a larger and fuller life, better homes to dwell in, improved surroundings, a share in the world's good things, and thus you have a paradox of many wants, but fewer opportunities to gratify them. Two London cabbies were glaring at each other. "Aw, wot's the matter with you?" demanded one. "Nothing's the matter with me," said the other. "Well you gave me a narsty look anyhow." "Me! Why certainly you have a narsty look; but I didn't give it to you, s'help me." True, the "narsty" look is before us in these troublous times, and I feel sure you will agree the picture I have outlined is not overdrawn. How far our commodity can be made useful in mitigating these hardships remains to be seen.

We invite Mr. Goodenough and others whom we shall have the pleasure of hearing this afternoon to give us the benefit of their experience and advice in coping with the prevailing disabilities by means of the service which gas supply enables us to bring into every household. Consider the position of even the smallest of these towns without a gas supply. Suppose, for a moment, the possibility of the gas supply being withdrawn even temporarily, what a blank would be felt in the domestic and commercial life of any place so unfortunate as to lose its ubiquitous service of gaseous fuel—its light, heat, and power. During an air raid in Surrey, it was the writer's experience to realize this happening; for the gas to the town was cut off at sunset, and a large share of one's daily comforts and convenience became an aching void. So much then for the necessity for our existence as a silent and very ready servant, ministering to every want and contributing so materially to the health and happiness of the community. Like the air we breathe and the water we drink, gas supply is regarded as the handmaid of modern civilization, free to minister to every want of daily life;

and I venture to predict that in the future this demand will increase more and more.

Statutory Disabilities.

In the early days, gas excelled mainly in the domain of illumination; and, let it here be said, it still ministers with perfect success as a lighting agent. We know that high-pressure gas-lamps hold the field for brilliancy of effect and form the best and cheapest light. It is curious to read in a standard work on gas lighting, written over a hundred years ago, the following: "The uses of the gas-lights justify us in attaching great importance to the discovery, and, if reduced to practice all over the kingdom, would employ a large capital in a most advantageous and productive way." But it is not in lighting alone that gas maintains its reputation. As a heating agent, it easily outdistances all competitors, and maintains a supremacy which cannot be challenged. Rivals come forward, and pet schemes are exploited with the halo of a Government blessing—a doubtful advantage, by the way; but the old gas supply goes steadily along, pursuing its useful career of universal service regardless of subsidies and independent of preferential treatment.

This aspect of service which we render to the public does not appear to have occurred to the powers that be, whose horizon seems limited to the policy of get all they can, but give nothing in return. Our record during the war forms a striking example of national service cheerfully rendered. So far, however, from helping a necessary and serviceable industry, the authorities appear to restrict, by every device in their power, the development and realization of its usefulness. This is accomplished by opposition to the legitimate function of the industry's corporate life, by cutting down rates of charge to secure a temporary advantage, by limiting, and even reducing, the very moderate percentage of interest paid to those whose capital has helped to build up the undertaking—thus paralyzing the very source of its operations. The effect of this garotting policy is to put an end to the natural expansion so essential to progress, and to cripple both the undertaking's future advancement and its stability.

I ask you how can a gas company who only pay their shareholders a beggarly 3¾ p.ct. hope to compete in the open market for a share of the capital required by industrial concerns in the extension of business. In response to our leader's mild and most polite protests, which appear to be as about effective as trying to hunt a tiger with a pea-shooter, we are told: "Ah well 3¾ p.ct. is better than no dividend at all." In fact, more than one gas company in our district is already in this latter predicament, through not fault of its own. It is this grandmotherly legislation, begotten of a total lack of appreciation of invaluable services rendered by our commodity to the public, that lies at the root of the trouble, and hangs like a pall over the operations of our industry.

Safeguarding the Future.

A distinguished authority has told us that the outbreak of war found us "middle aged." What this means I cannot describe; but I do know that, in a general way, there is a certain atmosphere of apathy and inertia such as characterise old and staid institutions, a kind of dry rot, which it is hoped the B.C.G.A., with new ideas and its active policy, will effectually eradicate. This apathy is, I am convinced, more apparent than real. The industry is so hedged round with restrictions in the belief that, as a regulated monopoly, we ought to be kept in leading strings and only allowed to move in the narrowest of circles that the true spirit of enterprise is warped and stifled, thus checking initiative and freedom of action.

With reasonable liberty of action, a general speeding-up would soon occur; and under such conditions, the position could be rapidly improved. Let me quote words from a leading contemporary. A writer in "The Times" states that "although, from the financial point of view, the position at the moment is far from attractive, the gas industry is more prosperous than ever, to the extent that the tribulations and exigencies of war have swept away once for all the old system with which it was saturated, and have opened up a new vista. The legislator may not even yet have realized the necessity for amending the archaic restrictions with which his predecessors saddled the industry." How, then, shall we extricate ourselves from the morass of ineptitude into which we have allowed ourselves to be drawn?

I am not dealing with new and vital developments of manufacture, or any technical problems with which our makers of engineering plant will have to grapple, or the very important question of coal conservation, in which more than any other industry we are vitally interested, but rather with the administrative side of gas undertakings. In this connection, there is one word which I venture to submit in order to express our aspirations—viz., "Unity."

Already have I trespassed much on your time and patience; and I will not, therefore, inflict upon you at length any further observations bearing upon this question. I may, however, be allowed to summarize one or two points for your consideration.

1.—That all gas undertakings in a given area should be linked-up where practicable. The suggestion is not new; but recent experiences give it new application and force. As our American friends would say, "This means an amalgamation of interests."

2.—That the purchase of raw materials, such as coal, oil, iron, &c., be made on a co-operative basis by a special expert for each district.

3.—That residual products be worked-up and disposed of by a jointly owned or controlled chemical works, so that each works may receive its full share of the benefits and save intermediate profits.

4.—That combined action be taken in fighting for fair and equitable treatment by parliamentary and public authorities. As an example, may I call attention to the imposition of a tax upon our industry in Wales of 2s. 6d. per ton on all coal consumed, over and above the limitation price paid in any other part of the country, and the necessity for a combination of effort to obtain the repeal of this obnoxious and unnecessary impost.

5.—To give the British Commercial Gas Association and the National Gas Council hearty and practical support.

It should be a point of honour that every gas undertaking, large or small, should associate itself with these important organizations for mutual protection and co-operative action. Unity is more than a mere expression of will—more than a pious hope that we may all pull together sometimes and somehow. The unity I speak of is a perfect accord of intention to clear away all abuses, to sweep away fossilized legislation, and to establish the industry upon a sound and popular basis. This very important and momentous period of reconstruction must be tackled, fought, and won by combined effort. Having established our position, we must continue the same spirit of unity in order to cement the compact, if our future prosperity is to be maintained.

And who, let me ask, will benefit from such an enlightened and far-seeing policy? Undoubtedly the consumer, who stands to gain by our enterprise, by our inventions, by our skill in management, and by the improvements and economies which we place at his command. Let me say, therefore, in conclusion, that upon loyal and wholehearted action the future success of good and cheap gas depends; and those who adopt a bold and vigorous policy in the administration of their works have no cause to fear the stability of the gas industry, which is now considered indispensable to an advanced civilization and a valuable asset of our national life.

STATEMENT OF MR. GOODENOUGH.

Mr. F. W. Goodenough was next called upon to address the meeting; and he began by remarking that though this was his first visit to Cardiff, he hoped it would not by any means be the last. He said he would like to accentuate the fact that the British Commercial Gas Association was a British Association, and not a London Association. It was universal in its work and universal in its benefits; and though it had its seat in the Metropolis, it did not confine itself to London or the South of England, but was a truly National Association. He was sure they would agree with him that they had listened to a most interesting address from Mr. Clarry. He said in the course of it that he did not know what it was to feel middle-aged. They would realize that his address was evidence of continued youth. It showed a very clear grasp of the broad principles to which the gas industry had to give its attention in these days, and was really a series of brief but illuminating and stimulating references to the points which were at present of interest and much concern both to the gas industry and to the community—because, as Mr. Clarry so soundly said, the prosperity of the industry made for the advantage of the consumer. This was a note that the Association had always tried to strike in connection with their work—that they benefited both the gas industry and the community as a whole.

Mr. Clarry ended his address with an appeal for unity, and said unity should be something more than a pious hope. If he (Mr. Goodenough), as Chairman of the Executive, might say so, it was practical sympathy as well as verbal sympathy that the Association needed, because it could only properly carry on its work, which was for the benefit of all, if all would contribute. His own Company "sympathized" to the extent of between £3000 and £4000 a year; and it was up to every gas undertaking—for every gas undertaking must benefit by the work they did—to "sympathize" in proportion to the extent of the output of their works. Mr. Clarry said, and he was sure rightly, that all members in the district were anxious to progress; and it was the business of the Association to help them to progress, and in so doing to help the consumers also. He (Mr. Goodenough) laid stress upon this point, because he believed there were present a number of representatives on the consumers' side as well as on the sellers' side; and he did want to make it clear that this conference was not merely for the benefit of the gas industry. There were two aspects of such a conference—its service to the industry, and its service to the community; but these two services were really only one, because unless the gas industry satisfied its consumers, and gave them good service and a square deal, the industry could not prosper. Only so could they go with clean hands to Parliament, and ask them to revise the grandmotherly legislation—or rather the stepmotherly legislation, for there was not much kindness about it—from which they suffered at the present time. The whole basis of successful commerce was the mutual profit of buyer and seller, and service all the time to the community. In the gas industry, it should always be remembered, they were under a very special obligation to observe this law. They were granted monopoly rights, which carried with them, as a consequence, monopoly duties. They were the only people in any particular district who could supply what was an absolute necessity of modern civilization; and it was up to them to give good service. One of their duties, it always seemed to him, was to do the very utmost they could to develop their business. It might seem strange to talk of this as a duty. It was what every business man would probably regard as one of the first principles in the conduct of business. When one had monopoly

rights there might perhaps be a tendency to rely more upon this than upon one's activity for development. He did not know whether there was any such attitude of complacency in Wales; but certainly the war had given a good shaking-up to any such attitude anywhere.

They must not get into a mood of self-satisfaction. A good deal had been heard lately about the percentage of inerts. The percentage of inerts was high in some places other than the retort-house. There was a percentage of inerts sometimes on the administrative side as well as on the manufacturinng side; but if they were to be of full benefit to the community they served and to themselves, they must constantly be progressive. It was the duty of the Association to help them in this. The manager of a gas undertaking had a great deal on his hands. He had the financial side to look after, the labour side, the buying of raw materials and the disposal of residuals, the control of the staff, and no end of work always on his hands; and it was not invariably easy for him to give time and thought to plans for the development of business in his district. They sometimes had to be put aside for more urgent matters. It was the business of the Association to relieve the manager to the utmost possible extent of all this work; and they had organized a scheme for doing this still more fully in the future than had been the case in the past. It was down on the agenda that afternoon for Mr. F. H. Holland to give a description of the scheme he proposed for the development of the sale of gas; but it was felt that time would not admit of this being adequately done. The scheme had been prepared to make it easy for gas managers to determine what were the possibilities of increasing business in their districts, and then to develop schemes for securing this business. They were all of them aware how many consumers they had, and the average consumption per consumer; but how many of them had any idea of what the average consumption might be, if they got each consumer to take all the gas he could advantageously use? The determination of these possibilities, *plus* the provision of continuous schemes prepared by an expert for turning the possibilities into business, he thought had never been undertaken before. As he had said, however, the Association had now prepared plans for doing so; and any manager who was interested in learning more about it, could get full particulars by communicating with the Secretary, at an interview rather than by correspondence, because it was a matter where whatever scheme was devised must necessarily be made to meet the requirements of each particular undertaking. They would agree with him that in the gas industry in the past there had not been given the attention to selling that was to be found in the majority of other businesses. The prime consideration in almost every other business was selling, not making. The making had to come after the business had been secured. But because they had a monopoly, and were a technical industry, sufficient attention had not been given to the development of business. It was the work of the Association to stimulate this side, and to assist managers to develop salesmanship, by providing them with the services of a good consultant on salesmanship—a man who was a thorough expert on the advising and carrying out of schemes of development. The Association, of course, did a great deal in the way of stimulating interest in gas by means of general and local publicity. It exercised the power of suggestion; and he would like to make it quite clear that this general publicity work that the Association had done must be of value to every undertaking in the kingdom, because it had been found of sufficient value to undertakings in all parts of the world—America, Africa, New Zealand, and elsewhere—to induce them to subscribe off their own bat. He did not think that they in this country should be behind the Dominions in subscribing towards work from which they benefited. The development of business always led to the lowering of costs. The Association helped the industry and the community by undertaking the dissemination of facts—which, after all, was what true advertising was. That advertisement was of most value which told the truth most exactly.

Mr. Goodenough then proceeded with his address mainly on the lines of that which he delivered at the Reading Conference [see *ante*, p. 304]. He concluded by remarking that, providing the Association was adequately backed by gas undertakings, it could do a great deal of work for the industry. He believed their motto was, "All for one, and one for all;" and he would commend this to them, and ask them to see that they did their share on the one side to enable the Association on the other to do its share towards bringing to the gas industry that greatly increased prosperity which he believed lay before it if the opportunities were grasped.

The Chairman remarked that it had always been said that "there was a power behind the throne." Mr. Mason, the Secretary of the Association, was this power; and they were very pleased to welcome him. His devotion to the gas interests of the country had he (the speaker) believed brought on a serious illness, which for a time had deprived them of his services.

Some Words from the Secretary.

Mr. W. M. Mason said his Chief, Mr. Goodenough, was really the "power behind the throne." He had been acknowledged the author of the Association, and the inspiration behind it all through. It was always a pleasure to come to Cardiff, because of the hospitality one received there. In going about to these conferences, he made a habit of inquiring at the bookstall to try and find out in how many publications sold in the district the Association's regular advertisements appeared. It would probably be a surprise to Mr. Clarry to know the number of publications there in which the Association were regularly advertising. One did not get a very great deal of advertising for £100. In their district between fifty and sixty papers were distributed in which the Association's advertisements were appearing. Mr. Goodenough said the Gas Light and Coke Company subscribed over £3000, which was a tremendous sum; but even that Company could not afford to advertise in all the papers that the Association were able to do because of the pooled subscriptions. The other side was that there were about thirty undertakings in Wales who subscribed to the Association, and about ninety who did not. Some might ask what was the good of spending £10,000 or £20,000 in advertising; and by way of reply he quoted from some exceedingly gratifying letters recently received by the Association which bore upon the point.

The All-Gas House.

The Chairman then called upon Mr. Reginald G. Clarry, of Swansea, to open a discussion upon "All-Gas Houses in Relation to National Housing Schemes." Mr. Clarry's paper, and the discussion which ensued upon it, will be found reported on pp. 362-3.

A Vote of Thanks.

The Chairman proposed a vote of thanks to Mr. George Clarry and Mr. Goodenough for their addresses, and to Mr. Reginald Clarry and the various speakers on his paper.

An Inquiring Consumer.

Mr. A. E. Davey (Aberdare), in seconding the vote, said there was one matter which he thought ought to be made known to the meeting. In that day's "South Wales News," the following appeared:

Why Gas Bills are Bigger.

A gas consumer asks: "Why does a kettle take twenty minutes to boil on my gas-stove now against ten minutes or less before the war? Why, too, must I burn gas for an hour to get a hot bath, whereas it took but twenty minutes in 1914?"

Inquiries show that in many cases the gas companies are still continuing the war practice of extracting benzol from their gas before turning it into the mains. The old calorific standard still holds good in law, but not in practice; for the Local Government Board during the war circularized local authorities asking them not to take proceedings against the companies furnishing low-standard gas as the extracted products were needed for munitions. This referred to "toluol," a constituent of T.N.T.

Now, however, T.N.T. is a drug in the market; but benzol, an earlier derivative, is still most valuable, and is apparently still taken from the gas by many companies. Till the old calorific standard is restored, kettles will take an abnormal time to boil, though specially designed burners would be a help.

He thought some explanation should be given of the actual position. Some person might have had it in mind that this was an opportune time to insert such a paragraph; and it was up to them to state the facts, so as to safeguard their own interests.

The Chairman: The person who wrote that ought to have asked for an inspector to ascertain the cause.

Mr. Goodenough, in replying on behalf of all those to whom the vote applied, said that the simple answer to the paragraph just read was that the extraction of benzol from the gas did not deteriorate the calorific value more than 6 p.ct. at the outside; so it could not be due to this that the kettle took twenty instead of ten minutes to boil. He very much doubted if the undertaking showed an increase of 100 p.ct. in its output. He had had occasional complaints of this sort during the war; and he had invariably found that the power of suggestion had had more to do with them than anything else. Sometimes complainers read that something was taken out of the gas, and then they formed the idea that the gas was not so good. As a rule, "bad gas" was the last thing that was the cause. Before sitting down he wished to tender to the Directors and officers of the Cardiff Gas Company their heartiest thanks for the hospitality extended to them and for the arrangements made for the conference.

Mr. Octavius Thomas seconded the vote, which was cordially passed, and acknowledged by the Chairman.

Afternoon tea brought the proceedings to a close.

MEETING AT DERBY.

The Conference under the auspices of the Midland District Committee of the British Commercial Gas Association took place on Friday afternoon in the offices of the Derby Gas Light and Coke Company, Friargate, under the presidency of Mr. W. Woolley, the Vice-Chairman of the Company.

A Welcome.

The Chairman expressed regret that Alderman J. W. Newbold, J.P., the Chairman of the Company, was absent through ill-health; but it afforded him (the speaker) much pleasure, on his behalf, and on behalf of the other Directors of the Company, to offer those present a hearty welcome to Derby. He hoped the conference would have good results, and assist towards a more extended use of gas for the many purposes to which it was suited. He thought one object of the conference was to bring to the notice of consumers the best method of using gas in order to obtain from it the most efficient results. The interests of the suppliers and the consumers were mutual, as was evidenced by the sliding-scale arrangements. It was desirable that they should satisfy the users and effect all the savings possible in their interest. He felt sure those municipalities who owned gas undertakings would realize the burden that the war had placed upon the industry. Before long he hoped that they would be able to say "good-bye" to "D.O.R.A.," and probably none of them would put on mourning for it. They must admit that, while their one object had been to win the war, the moment the war was over they should try to get down to peace work on all sides. He supposed at the present time the principal thing that was being talked about was the nationalization of everything and everybody; but he much doubted whether the supposed merits of such ownership would ever be fully realized. People generally advocated the nationalization of things which did not concern them, and which they knew nothing about. To understand this, they had only to read the evidence given by Mr. Sidney Webb before the Coal Commission, when he was being severely cross-examined by Mr. Evan Williams, as representing the South Wales coalowners. He admitted that he knew nothing at all about the working of mines. If this was the case, what was he there for? Was he to govern the country? Then there was Sir Leo Money, who told the Commission that coal ought never to be taken out of the truck, except direct to the consumer's cellar. If Sir Leo could work out such a scheme in practice, the coalowners of this country would doubtless give him a very handsome salary. Let him go and

work for the coalowners at once. As to the financial conditions under which the gas industry was labouring at the present moment, they were most of them under the sliding-scale; and they knew how very adversely to the interests of gas shareholders the sliding-scale worked, with the existing high prices of coal, material, wages, &c. He hoped that before long Parliament would be induced to take some step that would give to the shareholders—with due regard to the consumers—an adequate return upon the money they had invested. The cutting-down of dividends because under present conditions they had had to increase the price of gas, was nothing less than iniquitous. While the Government were paying more than 5 p.ct. for loans, they expected the public to put their money into gas undertakings, and to get in some cases 3½ p.ct., because of the adverse working of the sliding-scale. Their Engineer, Mr. Ferguson Bell, would deal with some practical questions a great deal better than he himself could.

ADDRESS BY MR. J. F. BELL.

Mr. J. FERGUSON BELL, the Engineer and Manager of the Derby Gas Company, then delivered the following opening address:

GAS STANDARDS.

The report and recommendations of the Fuel Research Board, who, in June, 1917, were asked by the Board of Trade to advise as to "What is the most suitable composition and quality of gas, and minimum pressure at which it should be generally supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used," is issued, and may be obtained at a nominal charge of one penny. This report contains recommendations so highly important, and likely to exercise so wide-reaching an effect on the gas industry, that I propose to draw attention to the more salient features contained therein.

In view of their importance, the wide field covered by the terms of reference, and the large issues involved, the time taken by the Committee has evidently been well spent. The report indicates an impartial endeavour by a Board constituted of four members, all eminent experts in science and industry, to harmonize presupposed conflicting interests to which the questions at issue give rise; and in addition to formulate a knowledge on those scientific principles upon which the control of the gas industry and ancillary products should in the National interests in future be based, rather than upon earlier legal enactments, which, although perhaps more or less suitable at the time, are now burdensome, a hindrance to enterprise, tend to bar progress, and shackle the industry.

As pointed out in the report, the gas industry uses from 18 to 20 million tons of coal per annum, or approximately one-tenth the total home consumption, and is the most important existing organization for the distribution of potential heat energy. The recommendations are framed to give suppliers greater freedom, and also to enable them to adopt and develop newer methods of production. The interests of consumers are to be safeguarded, in that the charge shall represent a certain number of thermal units rather than volume of gas supplied.

It is satisfactory to have it on record from the Fuel Research Board that they recognize that war conditions placed producers of gas in a position of the gravest difficulty. Unhappily, a foolish parsimonious policy adopted by Parliament to a great industry has not so far lessened, but rather increased these difficulties. The desire expressed that both producers and consumers may profit by the lessons of four years of war, by more effective co-operation, will find a ready response by those more immediately responsible for the control of the industry. I trust the public will realize that the present condition of affairs is very unsatisfactory, both to gas companies and local authorities who own gas undertakings.

It is of special importance that a certain elasticity is suggested, as regards the prescribed standards, to give freedom of choice in raw materials and processes of manufacture. The interests of consumers, as already mentioned, are to be protected by the price charged being in direct ratio to the actual number of thermal units supplied, which indicates that the Board consider that, within the prescribed limit of 400 to 500 B.Th.U. per c.ft., its utility is directly proportional to the total heating value of the gas. The composition of combustible constituents is not defined, excepting the maximum limits of inerts, which it is proposed shall not exceed 12 p.ct. The practice of dilution by inert gases cannot be too strongly condemned; but it should be remembered that all works are not equipped to enable them to limit the inerts to this low figure. Hence it appears to me that 15 p.ct. would be a more reasonable maximum for inert constituents, especially as the proposed new method of charging for gas is to be based on the actual thermal units supplied.

The addition of blue water gas, which has a calorific value of about 300 B.Th.U.s per cubic foot, is approved as the best natural blend for mixing with coal gas. I find, with an addition of from 18 to 25 p.ct. of blue water gas mixed with straight coal gas, varying with the quality of the coal gas, the calorific value can be regularly maintained at 500 B.Th.U., the flame temperature of combustion is higher, and this mixed gas gives equal satisfaction to ordinary coal gas. By this method, an increased number of heat units is supplied to the consumers per ton of coal carbonized; and it is to my mind in every way preferable to any other system of increasing the number of heat units supplied. I am one who believes the best policy is to supply gas of about 500 B.Th.U., of approximate standard composition, at a pressure not less than 2 in. at the outlet of the consumer's meter.

The report will be generally accepted as a welcome addition towards the solution of the production and use of gaseous fuel on sound lines, which I believe will be more and more recognized as one of the best and most practical means for the conservation of our coal supplies, by the distribution of cheap potential heat energy in a convenient form. I can only hope that those in authority will give sympathetic consideration to the sensible recommendations of the Fuel Research Board, and, before the already over-burdened taxpayers are committed to expensive super central stations for the generation of electricity in bulk, the Government will see that the means at hand are at least fully developed, and encouragement given on the lines of this report. I very briefly refer later to the proposed expenditure for super-electric generating stations.

THE SMOKE PERIL.

Sir Watson Cheyne, M.P. for the Scottish Universities, on the debate on Housing for Scotland in the House of Commons on May 5, stated that the mortality in the towns and villages differed greatly. The rural mortality of children was from 40 to 60 per 1000; the average town mortality was 120 to 140 per 1000; and in industrial towns they had not reduced mortality materially by their model dwellings. The chief cause of the great difference between rural and urban mortality statistics is due to coal smoke and the noxious elements contained in smoke. He pointed out that plants would not grow in densely crowded parts of towns—even stone buildings are attacked. Botanists state that lichen would not grow in London, or within two or three miles of London. The lungs of town inhabitants showed that they were black, hard, and full of dense particles, which caused lung disease, many deaths, and much sickness.

It was calculated that the amount of solid particles that fell in the suburbs of London was 440 tons per square mile in the course of a year. In Glasgow, it amounted to 1330 tons per square mile. It is known that factories often contribute to this smoke nuisance; but the smoke pollution of the atmosphere is to a very large extent from dwelling houses. The domestic fire is not only frightfully extravagant in the use of coal, but also vitiates the air with smoke and other impurities deleterious to health. There can be no question that the extended use of gaseous and smokeless fuel would produce in all our towns a more healthful and pure atmosphere, more sunlight, with improved health of the community, and a very substantial decrease in the death rate. Never before was child life more precious than to-day; and any efforts to bring about this much-needed improvement is well worth our strenuous exertions towards so desirable an object. The work accomplished by the "B.C.G.A.," in bringing to the notice of consumers and potential consumers the merits of gaseous fuel for heating and cooking purposes, deserves well-merited recognition, which can best be given by our active support of the Association. I look to the gas industry to bring about this desirable reform.

It is satisfactory to know that makers of gas apparatus are not content to rest on their laurels; the recent improvements in gas fires and cooking stoves are epoch-making. The efforts of pioneers in this direction will, I feel sure, meet with due reward. In our show-rooms are several examples of the latest gas appliances, which members are cordially invited to inspect.

POST-WAR CONTROL.

I view with alarm the extravagance and enormous increase in our national expenditure, which, if continued, must eventually lead to financial disaster. It does not yet appear to be realized that for over four years we were spending our accumulated capital at an increasing ratio. It seems quite unnecessary to continue the many expensive State departments, which are in most instances a hindrance to trade, especially when the circumstances which necessitated their creation have disappeared. There is an uneasy feeling abroad that one result of the war has been the creation of a huge autocratic army of State officials, who are loth to relinquish their positions. We look to those in authority to see that this army, as well as the soldiers, are demobilised without further delay.

We cannot expect to return to pre-war conditions; but it is devoutly to be hoped that all forms of rationing and registration will have disappeared before the Peace celebrations. Further, the cost of misjudged purchases made by various Government Departments, which in a great war is inevitable, should be borne by the whole community, and not simply by the users of the commodity over which the losses had been incurred. In many instances the Government are maintaining unnecessarily high controlled prices of goods of which they happen to hold large stocks because of the loss incurred upon realization. This is an indefensible restriction of trade, the maintenance of artificial prices is unsound business, and results in serious injury to many now sorely pressed industries.

COAL-GAS AND ELECTRICITY.

It is not my usual practice to make comparisons between gas and electricity, as I am of opinion that there is sufficiently wide scope for both. However, there has of late been so much exaggeration of the supposed benefits to be obtained by the erection of super-stations for the generation of electricity, and the proposed substitution of electricity for gas in the supply of

heat, light, and power, that the report just issued on the coal gas and electrical supply industries of the United Kingdom by such eminent practical scientists as Sir Dugald Clerk, F.R.S., Prof. Smithells, F.R.S., and Prof. Cobb is of special interest at the present time.

Instead of coal conservation resulting from the more extended use of electricity for heating purposes, it is just the reverse. The result of their investigations are briefly summarized by them; and I cannot do better than refer to their conclusions as stated in the report. [The conclusions referred to were given in the "Journal" for April 29 last, p. 235.]

Mr. F. W. Goodenough (the Chairman of the Executive of the Association) remarked that as the Chairman had to leave on other business, he would at this stage propose that the best thanks of the meeting be given to the Chairman and Directors of the Derby Gas Company, and to Mr. Bell, for the hospitality that had been extended to the Association, and to Mr. Woolley for presiding and giving them so hearty a welcome. He was gratified to see such an excellent meeting; and it was a pleasure to all of them to be under the roof of such a progressive undertaking as the Derby Gas Company, with an opportunity of seeing show-rooms which were a model. They were also indebted to the Chairman for his opening remarks, and to Mr. Bell for the able address he had given them.

Alderman Andrews, in seconding, said it would be quite impossible for him to comment upon the statements made by the Chairman and Mr. Bell. He had been particularly struck by one observation made by the latter gentleman, with regard to the comparison of gas and electricity for power. During the recent election he had been told that under the proposed Government electricity scheme, power would be supplied on a scale unthought of by power users in the past. His informant said that in a certain engineering works an advance of 6s. per week which the men were wanting would be nothing when compared with the saving secured by cheap power. Well, he (the speaker) worked the matter out, and found that a rise to the men of 1s. a week would represent twice the total amount paid by the firm for power. That was the sort of stuff they had to deal with when talking about matters of this kind. Perhaps when the scheme came before Parliament someone would have the audacity to say something which was true.

The vote was carried with applause; and

The Chairman, in response, expressed the hope that this would not be the last occasion on which the Association would make use of the Company's offices for conferences of this kind.

Mr. Goodenough's Statement.

Mr. Goodenough then took the chair, and apologized for the absence of Lord Moulton, who, owing to his being in Paris, had been unable to attend any of this series of District Conferences. As they were aware, Lord Moulton had shown his sympathy with the work of the Association by accepting the presidency, which was a very high honour to them.

The Late Mr. Berridge.

He wished to make reference to the sad loss which the Association and the Midlands had suffered in the past year by the death of Mr. Thomas Berridge, of Leamington. He was a very strong friend of the Association from its inception, and was always a man who helped with criticism and did not seek to flatter. He was a valuable member of the Executive; and the industry had lost greatly by his death. They were glad to see with them Dr. Mason, the Vice-Chairman of the Leamington Gas Company; and he was sure they would wish to express to him and to his co-Directors their sympathy in the loss they had sustained.

Resignation of Sir Hallewell Rogers.

There was another matter to which also he had to refer—the loss which the industry and the Midlands had suffered by the retirement from the Birmingham City Council, and therefore from the chairmanship of the Corporation Gas Committee, of Sir Hallewell Rogers. He yesterday received from him a letter, which he would read.

> Dear Mr. Goodenough,—I regret that it has been necessary, owing to doctor's orders, for me to give up my work on the Birmingham City Council, and consequently my chairmanship of the Gas Committee here. I feel this severance very keenly after the many years that I have been so closely connected with the activities of the gas industry through the office I have held in Birmingham. My parliamentary duties, however, coupled with my many business engagements, have been such a tax upon me that my doctor has insisted upon my giving up a portion of my work.
>
> As a necessary consequence of my action, I presume that my connection with the B.C.G.A. must also cease; and I therefore place my resignation in your hands.
>
> If I can at any time do anything to advance the cause of the gas industry (in which I shall retain the keenest interest), please do not fail to let me know.
>
> It is, of course, understood that my invitation to the B.C.G.A. to be my guests on the occasion of the Annual Conference next October, still stands.
>
> I am ordered away for a rest, but shall no doubt be seeing you in London in due course, and can then have a talk with you about the matter.
>
> I should like to thank you for the considerable assistance you have rendered to me while acting as President of the B.C.G.A., and to wish you and the Association every success in the strenuous time that you have before you.
>
> (Signed) Hallewell Rogers.
>
> *Council House, Birmingham, May 7*, 1919.

He was sure they would wish to convey to Sir Hallewell Rogers their regret at the cause which had led to his retirement, and their appreciation of the great services which he had for many years rendered to the gas industry and to the Association.

Mr. Goodenough then proceeded to deal with the work and policy of the British Commercial Gas Association; and before sitting down, he asked [without receiving any response] whether there were any questions which those present would like to ask so as to further elucidate what he had been saying. This was, he remarked, the Association's first after-the-war conference in the Midlands. He thought if there was one lesson more than another which they might have drawn from the war, it had been the vital importance of unity and co-operation in any matter, if that matter was to be carried to a successful issue.

Gas Equipment and Housing Schemes.

Mr. R. J. Rogers (Fittings Superintendent of the Birmingham Corporation Gas Department) next read a paper on "Gas Equipment in Relation to National Housing Schemes," but owing to great pressure on our space in the present issue, it has unfortunately been found necessary to hold over until next week this paper, which went very fully into the subject with which it dealt.

At its conclusion, Mr. Rogers was heartily thanked for his paper.

Councillor Tucker (Walsall) suggested that great advantage would accrue from the printing and circulating among the members of the valuable addresses to which they had listened at the conference. The facts which had been quoted by the Chairman should prove particularly useful to them. They had heard a good deal about advertising that afternoon; and he did not think they could do better than spend money in the direction he had indicated.

The Chairman intimated that a full report would be circulated among the members of the Association through the medium of a special issue of the "Bulletin."

Radiant Heat Preferable to Central Heating.

Mr. Goodenough remarked that in the paper reference was made twice to one-and-a-half tons of coke being fully equivalent to a ton of coal. The author only meant that this was the equivalent given in the Rationing Order; but that was done merely to encourage the use of coke, and was not intended as an indication that one-and-a-half tons of coke were needed to do the work of a ton of coal. He would not like this idea to get about. They knew that the calorific value of coke was practically identical with that of coal; and owing to its not containing the volatile elements given off from the coal, a higher percentage of heat was available, because none was absorbed in driving off the volatile matter. The Association published a pamphlet on "How to Maintain an Incandescent Burner;" and if any members were desirous of securing such literature for distribution, they could obtain it from them. One of the advantages of the Association to the members was that they were able to buy literature at wholesale prices in retail quantities. This was one of the benefits arising from co-operation. The importance of adequate carcass pipes in dwellings must always be borne in mind in connection with housing schemes. It appeared that central heating had been condemned by the tenants on the estate to which reference was made in the paper. He (the speaker) was quite sure that central heating by radiators was not at all suited to a country where, as an American had said, there is not a climate, but only a collection of samples. What they needed was a method more easily adapted to circumstances than was the case with central heating. The most hygienic form of heating was the radiant heat given off by an open coal or gas fire—and preferably the open gas-fire, because while a coal-fire burned unpurified gas, a gas-fire consumed purified gas. It had been fully established that heating by radiation was the ideal method of heating. They had a very strong scientific hygienic argument on this point in favour of gas heating. As to a specification for gas-piping, if it seemed possible to get the Government Department dealing with the housing question to adopt a definite specification for piping for different-sized houses, no effort would be spared to induce them to do so.

Mr. Mason said he had been handed a cutting from a very widely-read weekly paper, which not only bore upon the point under discussion, but also incidentally brought out something of the work the Association stood for. The article dealt with the "Woman's Point of View;" and he read quotations from it advocating the use of electricity for various domestic purposes. This, he said, represented the sort of scheme some people had in their minds. The things mentioned could, of course, be done by electricity, if one was willing to pay for it, but the same work was now being done in hundreds of gas houses in Birmingham and all over the country, much more effectively than electricity could do it, and at one-fourth of the cost. One of the things the Association stood for was making this point of view known. The article from which he had read showed the necessity for a central organization like the British Commercial Gas Association watching these things, and trying to get the correct state of affairs put before the people and before the public authorities. In his own house he had a coke-boiler which was a most efficient little apparatus, giving an abundance of hot water in a 60-gallon tank. There were gas-fires in every room; and the work of the house was easily done.

Dr. Mason (Leamington) said he was very much interested in the housing question; and there was only one thing he did not quite understand. If there was not a fair-sized chimney, there arose the problem of ventilation, which was the great advantage of the coal-fire. There was not the slightest doubt that the proper method of heating was radiant heat. Central heating was only useful for the American climate and American ideas. Radiant heat would penetrate even through the clothes. This was one great advantage of the radiant heat of gas-fires. He would be glad to know whether there was any possibility of reducing the amount of gas consumed by fires, because unfortunately they did not compare very favourably with coal-fires in the matter of cost. How would a house heated half by coal and half by gas compare with one heated entirely by gas? In Leamington, a lot of the houses had taken to increasing the number of gas-fires; and the Gas Company had not felt the pinch of the war restrictions in the same way that some others had done. He had heard some grumbling about the gas bills; but this was, of course, due to the high prices of coal and labour.

Collateral Advantages of Gas.

Mr. Goodenough said that, on the point of comparative cost, one thing that must always be borne in mind was that the household

budget should be dealt with as a whole. People often forgot that if there had not been any gas-fires in a house—such as they found in Leamington—an extra servant would have been necessary. He recalled an incident that occurred to him some years ago. He was visiting a nursing home in London; and on interviewing the lady who was running it, he found there were gas-fires in every room, and that the cooking was done by gas. He said, "I see you have gas-fires everywhere. I suppose you find them very convenient?" She replied, "Yes; but they cost a lot of money. I, however, got rid of one of the maids the day they were put in." On having the account turned up on his return to the office, he found the total cost of gas in that house did not amount to the wages and keep of a servant. The gas bill was only £45; whereas a servant must have cost her at least £60 a year. In addition to this, there was the saving of the money that had formerly been spent on coal. People should set on the other side of the account the saving in work, and the possibility that gas might enable them to keep a good servant who might otherwise be lost. There were factors which led to the use of gas even when, fuel for fuel, it was dearer than coal. It was, however, sometimes a distinct disadvantage to advocate the use of gas in every room. It might be that the fire in the one room where it was used all day long might increase the bill to such an extent as to make the consumer so dissatisfied that he would turn all of the gas-fires out of the house.

Sales Organization.

After a pause for afternoon tea, the next item on the programme was taken. This was the presentation by Mr. F. H. HOLLAND of his paper [as reproduced in the "JOURNAL" last week in connection with the Reading conference], outlining a scheme for Sales Organization. The clear expounding by the author of his views was closely followed by those present.

Mr. GOODENOUGH, in introducing Mr. Holland, said they had laid their plans whereby the Association could help, not only undertakings to carry out salesmanship on much more studied lines than before, but each individual manager to do so without any very great trouble on his own part. They wanted to provide a scheme to which a manager would merely have to say, "Yes, that is what I want." The Association were offering them a first-class man to assist them to build up a first-class business on the top of the business they already possessed. Many undertakings were not big enough to engage a first-class sales manager as well as an engineer; and the Association wanted to supply them with one on a co-operative basis. There would not be time to fully discuss the matter that afternoon; but what they wanted members to do, if they were interested in the proposition, was to let Mr. Mason know, so that an appointment could be made for Mr. Holland to come down and talk the matter over with the manager in his own office, in order to settle how best the scheme could be applied to meet local requirements. It was not a cast-iron scheme, but could be modified to suit conditions.

Mr. MASON said that, as things had turned out, they could well have done with a day instead of an afternoon to discuss these important matters. He would like to add one word of warning. Some men to-day in the gas industry sat back in their chairs complacently when they heard of a scheme like this, and said, "Well, thank goodness, we have more business already than we know how to tackle." Not only they could not have too much to-day, but they ought to look a little ahead. There was now a strong undercurrent of competition; and no man could tell where the gas industry would be in ten years' time. There had been too many rule-of-thumb methods in the past. They wanted to get away from this, and come down to hard-and-fast business; and this they could do by taking up such a scheme as that suggested.

A Vote of Thanks.

Mr. J. T. LEWIS (Wellingborough) said he wished, on behalf of those present, to thank Mr. Goodenough very heartily indeed for the great service he had rendered to the industry by coming to Derby and giving them so interesting an address. Mr. Goodenough could congratulate himself, as could Mr. Bell and Mr. Mason, on the great success which had attended the conference. They must also thank Mr. Holland for his paper, which would require a lot of thinking over. He hoped they would as far as possible fall in with the suggestions contained in it.

Mr. C. H. CARDER (Oldbury) seconded the vote, and added that the amount of time which Mr. Goodenough managed to give to the affairs of the British Commercial Gas Association was a matter of wonder to them all. The driving power which he put into the movement, and the way in which the work was carried out by the staff, merited the greatest gratitude. Mr. Holland was to be congratulated upon his scheme. It was becoming increasingly necessary to apply scientific methods, not only to management, but to salesmanship.

Mr. BELL expressed his personal indebtedness to Mr. Goodenough for having come all the way from London to address them. The success of the conference had been largely due to his initiative. The meeting could do nothing but good. He would like Mr. Holland to come down to Derby very soon, and discuss his scheme. If he could help them to improve their business methods, they would be only too glad to take advantage of the assistance. Mr. Mason had mentioned that the subscription to the Association was only equal to one penny stamp per consumer per annum. He found that this in his own case was absolutely correct. This point could not be too strongly emphasized. He only hoped the whole of the gas industry would join the Association, and thus make it an even stronger and more important body in the future, so that it could do still better work. It was a question of funds to enable them to do all the advertising that they wished to.

Mr. GOODENOUGH, acknowledging the vote, said it had been a great pleasure to come down to Derby. Whatever services he had been able to render to the British Commercial Gas Association had been performed very willingly, for he felt that he was serving a good cause—which was always a great satisfaction.

THE PERFECT DOMESTIC SERVANT.

[A Paper read at the Cardiff Conference of the British Commercial Gas Association May 7.]

By REGINALD G. CLARRY, of Swansea.

You will, no doubt, be pleased to hear that this desideratum is available to everyone.

Gas for Domestic Purposes.

In practically every city, town, and hamlet of any size in the country, the householder is fortunate in having a cheap supply of gas, but so far has by no means made the fullest use of this constant and efficient servant.

Lighting.—In matters of lighting, incandescent burners only are to be used as the improved appliances. Shades and decorative effects have made such enormous strides during the past few years that the lighting service to the householder needs no special recommendation from me. It must, however, be recognized beyond question that open or flat-flame burners cannot be used, as this form of lighting has gone for good. Moreover, excellent incandescent burners are readily available to meet every requirement, down to as low and economic a consumption as ½ c.ft. per hour, easily maintaining the lowest cost of any lighting available to the householder.

Cooking.—The convenience, economy, and cleanliness in cooking by gas are so general and proven, that a gas cooker may be regarded as part of the necessary equipment of every modern house, even should it only be used on specific occasions or during the summer months.

Gas-Fires.—Considerable prejudice existed in the matter of gas-fires up to a few years ago. The enormous improvements made by British manufacturers have placed gas-fires in an unassailable position. Adequate medical and scientific testimony can now be given on the desirability, from every health and utilitarian point of view, of the modern gas-fire.

For our purpose, there are two principal varieties of heat transmission. Convected heat, which is derived by the heating of the air, either by the direct importation of hot air or convection from heated surfaces, such as the 100 p.ct. efficiency gas-steam radiator or hot-water pipes, steam-pipes, &c. This form of heat, however, is more suitable for shops, passages, and large rooms, than comparatively small living rooms. The heat from the sun and a modern gas-fire is radiant heat—namely, heat which warms without heating the intervening air.

The effect of a coal-fire in a room means that a very large proportion (over three-quarters) of the heating value of the coal is lost to the consumer, up the chimney. It is not generally known or appreciated that considerable ventilating effect takes place with the modern gas-fire. Tests have been carried out in which it has been proved that a gas-fire will carry off 2000 to 4000 c.ft. of air per hour, effecting the most valuable ventilation in the room. Obviously, if air is changed and drawn out of the room by the gas-fire, no fumes can at the same time come into the room.

Similarly, the old-fashioned prejudice that the atmosphere of the room is made dry, and that a bowl of water in front of the fire is necessary, is entirely disproved by the fact that the heat given out is radiant heat. The general public will have noticed that the waiting room and surgeries of the bulk of up-to-date doctors and dentists are now fitted with modern gas-fires. The value of such fires in the sick room, bedrooms, and all or any rooms forms a great boon to the general public that is not sufficiently utilized.

With regard to water heating, either by the popular geyser, which is used intermittently for a specific occasion, or the gas-heated boiler or circulator, which replaces, or is used in conjunction with, the range boiler, gas is a servant which has no equal.

The extraordinary flexibility of gas is illustrated by the fact that it may be equally appreciated in the smallest cottage as in the largest mansion or hotel. "All-Gas" houses are by no means uncommon; and in every case—whether it be the small cottage, the middle-class house, the hotel, or the Red Cross Hospital, which has gas for all purposes—it has given entire satisfaction to all concerned.

Industrial Dwellings.

On every hand we hear of extensive schemes for the housing of the working casses. The workers have expressed their feelings in no uncertain manner upon different subjects, one of which is that they require the same comforts and conveniences in their homes as any other class of the community. Obviously the occasion is ripe to meet such reasonable requirements through the medium of gas, provision for which can be made during the construction of these industrial dwellings.

Carcassing Gas Connections.—The architect is required to be an expert in a large number of matters in connection with a housing scheme; and he will readily appreciate the prudence and necessity of providing adequate pipes and connections for the tenant's probable use of gas as part of the original construction. Further, that such supplies are taken to the right place, and are of adequate size; this provision is made at the fire-places for the occupation of the gas apparatus, thereby effecting an economy in the more expensive chimney construc-

tion necessary to meet the requirements of a coal-grate; also, in every case, making a proper tiled recess in a convenient position, for the gas-cooker. These items, while more or less in themselves small, will add materially to the finish of a house and to the tenant's ultimate comfort and convenience.

Ideal "All-Gas" Industrial Dwelling.

An ideal arrangement of gas service for a six-roomed workingman's dwelling may be cited as follows: The lighting throughout by means of incandescent gas at suitable and convenient points. The best room, or parlour, to be fitted with a gas-fire, which is at instant service for the few hours on which this room may be used per week.

The living room to be fitted with an open coal or coke fire, having a hot-water boiler, connected to the circulating system, at the back. A combined gas-heated boiler and storage cylinder should be fitted in the scullery, connected to the boiler behind the solid fuel fire in the living room, the gas-boiler to be used as a stand-by or auxiliary apparatus, so that, in the event of the fire not being required, it could be called into play by the simple expedient of lighting.

The scullery, or third room on the ground floor, to contain the gas-cooker, a gas heated wash-copper, and, in a corner suitably divided off, the bath, with hot water laid on.

At least one of the three bedrooms should be fitted with a gas-fire, for use in case of sickness.

While much can be said for this or any alternative arrangement of gas apparatus, the proposal I have just outlined appears to meet the whole of the conveniences and comforts demanded, consistent with economy in cost of installation and working. It does not require much imagination to picture the solid appreciation which would be felt by a worker's family, and particularly his wife who is mistress of a house arranged on these lines, in which healthy comforts and conveniences, and an enormous reduction in work and worry are purchased for a few shillings per week through the slot meter.

Assistance of Gas Undertakings.

No one will deny that gas undertakings have always catered for the industrial worker, notably by bringing the convenience of gas into their homes, through the medium of the penny-in-the-slot meter, in which the pipes, fittings, and apparatus have been installed without initial cost to the consumer. It is the business of the advisory staff of all gas undertakings to be experts in meeting consumers' requirements; and the data at their command are available for the consideration of architects designing housing schemes. It would be public negligence not to tap this supply of valuable information. It is very desirable from the various points of view that all opinions should be voiced upon this far-reaching subject; and a full discussion is invited, and would be welcomed, at this District Conference, where representatives of the several interests are present.

Coal Conservation.

In my few observations I have not been able to touch upon a matter which is of paramount and quite national importance—namely, the conservation of our coal supplies. But official and public opinion is fast coming to the obvious conclusion that the best possible way in which to conserve our coal resources is through the medium of the gas-works, where approximately 70 p.ct. of the initial heat value of the coal is returned as fuel or its equivalent, to the actual and economic benefit of the whole country.

We have been faced during the past few years with problems of great national importance, and are more or less used to a crisis as part of our every-day existence; but we must not make the mistake of allowing to pass the present excellent opportunity of seeing that the industrial worker is provided in his new dwellings with the perfect domestic servant, which will ensure health, happiness, and comfort in his home.

DISCUSSION.

The Chairman (Mr. C. E. Dovey) said there were different interests represented in the room; and he would much like to hear their views. The observations of architects and those representing public authorities connected with housing schemes would be of great benefit.

Mr. J. H. Canning (Newport) said the paper would form a useful guide to those wishful in the shortest possible time to go into the subject with which it dealt. He was glad to learn on the authority of Mr. Clarry that the flat-flame burner was dead. It was an extraordinary thing that, as time went on, continually more consumers seemed to wish to revive it. The sooner all consumers realized how wasteful it was, the better it would be. During the war the population generally had come to appreciate more and more the value of any aid in reducing work. In many cases, of course, the women of the household had taken to war work. Domestic servants had also done the same thing, and now showed singular disinclination to return to their old duties. No doubt, it would become increasingly difficult in future to obtain domestic labour; and not only that, but workmen were asking for easier conditions of labour, and the workman's wife and daughter would quite rightly demand the same thing. These great housing schemes were on foot; and they had heard it said that something like half-a-million dwellings were contemplated. He took it the local authorities would be the landlords; and the local authority should be a model landlord. They as suppliers of gas had too often in the past come across the retrograde landlord, who would not have gas put in his house. There were very few, of course; and eventually the crime brought about its own punishment, because people would not live in such houses. He would suggest to local authorities that these houses, in the interests of those who were to live in them, should be furnished with every labour-saving appliance that could be adapted to them at reasonable cost. It might be contended that the all-gas house was a dream; but he did not think this position could be maintained for a moment. He believed that special provision had had to be made in the Household Fuel and Lighting Order for the all-gas house. There were sufficient at the present moment to justify this; and he was sure there would be more in the future. It might be argued that electricity was able to furnish similar conveniences; and it was quite true that electricity was capable of lighting, cooking, and heating. But there was in the first place the enormous cost involved to the consumer; in the second place, as Mr. Goodenough had pointed out, there was the tremendous waste of fuel, which amounted to something like 300 p.ct., as compared with that required for gas; and, in the third place, there was another great difficulty which he had not generally seen touched upon—the question of time. People could not afford to wait an indefinite length of time for the boiling of kettles, the heating of water supplies, and the cooking of food; and except at extremely heavy cost, it was very difficult to carry out these operations electrically in a reasonable period of time. There was one other matter he would like to refer to, which Mr. Goodenough had touched upon. The gas industry already possessed a very big advantage over its rival electricity; but whereas electricity could not expect any great further development in efficiency, gas had very large latent possibilities, which were only waiting to be developed. He might mention one in particular—the gas-oven. It was quite true that the gas-oven could now cook far more economically than the electric oven; but at the same time no one would deny that there were possibilities in the way of developing the gas-oven so as to give a much higher efficiency than at present. He felt quite sure that, with the co-operation of the British Commercial Gas Association, they would witness such developments in the future. With the help of the Association, he hoped they would be able to induce those responsible for these great schemes of housing to consider, as Mr. Clarry had suggested, the laying-out of the houses in the first place for the adoption of a thoroughly good and efficient gas service throughout, and thus save the inmates—particularly the women folk—the immense labour involved in the use of solid fuel, the dust and cleaning, and other worries.

Mr. W. M. Mason, speaking not as a gas-man but as a private gas and coke consumer, said he had not an all-gas house, but he had a smokeless house. He had gas in every room; and there was also a coke boiler. It was very interesting to note that the total cost of running a smokeless house did not exceed the cost of the coal house. Then there was the additional point which was very often forgotten—that in many households which contained a complete installation of gas the services of a maid (which meant an annual expenditure of £50 or £60 at the very least)—could be done away with. He had an ordinary-sized house; and it would have been utterly impossible under other circumstances for his wife to have attempted, without being a slave, to run it as a modern woman wanted to run her house. A man wished his wife to have a good time at home, and not to be a slave. From the woman's point of view, it was absolutely essential that the all-gas house should be considered.

Mr. J. Mogford (Briton Ferry) said Mr. Clarry had put before them very well the possibility of having an all-gas house, and therefore assisting every household. He served an authority which had already carried out two housing schemes. Both had been laid out on fairly modern lines; and, different from many schemes of the kind, they were a paying proposition. Each house had been fitted up with gas for lighting, and a gas-cooker; and they found that this cooker was appreciated by every housewife who lived on the Council's land; and that the installations were profitable from the point of view of the Council. They had every room fitted with a gas-jet, with an incandescent burner to each fitting; and during the summer time the returns from these slot installations helped the undertaking considerably. The consumption in the summer invariably ran up. During the hottest period of the year the cooker was used entirely for the preparation of the household's food; and they had also seen lately that, during the shortage of coal, the inhabitants had found the cookers specially useful. They intended in the near future to undertake another scheme; and he understood the architect proposed to fit-up the houses on the lines indicated by Mr. Clarry. It was proposed that they should not only be fitted for gas lighting and cooking, but that facilities should be provided in the sitting-room and one or two of the bedrooms for the putting-in of a gas-fire. His Council were anxious that these houses should be equipped in such a manner that they would be the best-fitted houses in the district, with the view of economizing labour and of giving the workman's wife every facility that could possibly be offered her. They had advocated the use of gas in all directions. He would like to mention a point that he had always been keenly interested in as regarded these houses. Some councils proposed lighting their dwellings with electricity. In a small way, he was concerned with the supply of both gas and electricity; but he maintained that, if they wished to give the workman's wife the same facilities as were enjoyed by the wife of a man better able to afford luxuries, they must use gas. The lighting and heating of these cottages could only be carried out economically from a national point of view by means of gas. As a matter of fact, heating and cooking in such houses by electricity was from a commercial aspect practically impossible; and if one had to run a gas supply to the cottages for these purposes, they could not be lighted by electricity. They found that lighting by electricity during the summer months hardly paid for the reading of the meters. They all knew that Cardiff had pushed the gas supply, and possessed very efficient works. Historically, they expected Cardiff to lead the way for the gas industry throughout South Wales, if not throughout the country, because it was known that the first essay written on the production of gas from coal was written by the Bishop of Llandaff; so that Cardiff led the way in early times. Mr. Goodenough mentioned that the gas supply of the future would have to be cheaper; and he recommended that they should link-up the various works in a district. There were in South Wales two or three large works, and a good number of small ones; and he (the speaker) had always argued that if

they wanted to get a really cheap gas supply, they would have to link-up the small towns.

Mr. GOODENOUGH said that in the case of artizans' houses in particular there was a distinct advantage in gas for lighting, in that it gave off a certain amount of warmth, which was welcome at the time of year when lighting was mostly needed—in the winter. Where there was electricity, people had been known to prefer to burn lamps, so as to take the chill off the air in the dark days.

ANALYSIS OF COKE.

Precautions Necessary in Grinding Samples.

In the early part of this year, Mr. John Hughes, F.I.C., drew attention [see "JOURNAL," Jan. 21, p. 115] to the great differences frequently shown in figures of ash reported by different analysts in respect of duplicate samples of coke, and suggested that these differences are probably chiefly due to the methods adopted in reducing the coke to fine powder. He said that if the coke be ground into fine powder by means of an iron mill, or pounded in an ordinary iron mortar with an iron pestle, the fine powder will be largely contaminated with metallic iron, the presence of which can be easily demonstrated by passing a magnet through the powder, when a perfect forest of iron particles will be seen adhering to the edges. If, however, the pieces of coke are placed in a strong linen bag and broken into fragments sufficiently small to be subsequently reduced to fine powder in an agate mortar, no appreciable extraneous iron particles will be found in the finely-prepared powder. From an actual experiment, he found that a sample of coke prepared by the first method contained as much as 4 p.ct. of ash; whereas, when prepared by the second method, the ash did not exceed 1 p.ct.

These remarks suggested to Mr. A. E. Findley, of the Sheffield University, a series of experiments that are described by him in the April number of the "Journal of the Society of Chemical Industry." After giving an account of his investigations, he says it appears that it is usually during breaking the sample from small pieces to coarse powder that the largest amount of abrasion takes place; and Mr. Hughes seems to offer a satisfactory solution of the difficulty in the use of a strong linen bag. Once the coke is in the powder form, grinding in a mortar does not appreciably increase the quantity of ash. The question of abrasion of the linen itself naturally arises; but for a coke containing .10 p.ct. of ash it requires 10 p.ct. of linen in the coke to reduce the ash by 1 p.ct., and it seems unlikely that this amount could be introduced, however carelessly the sample is prepared. Efforts to estimate the quantity of linen that becomes incorporated with the coke were not successful. The effect upon the percentage of ash, is, however, exceedingly small.

High Price for Gas at Westward-Ho.—According to "John Bull," gas has gone up to the "giddy height" of 9s. per 1000 c.ft. at Westward-Ho. And, adds our contemporary: "On top of that, the collector, when calling on slot-gas customers every two months, politely demands a nimble shilling for rent of the meter. The Directors of the Gas Company sadly fear that even their present rates will yield no profit; so there may be more trouble brewing for the poor consumer. But let us hope not; even gas cannot rise for ever."

The Calorific Value of Burnley Gas.—Recently the Burnley Chamber of Trade sent a memorial to the Local Government Board protesting against an Order being made to permit the Corporation to charge more than 3s. 6d. per 1000 c.ft., unless a clause is included making it compulsory on the Corporation to supply gas with a minimum calorific value of 550 B.Th.U. The Gas Committee, having considered the Chamber's objection, have passed a resolution instructing the Engineer to provide a supply of the calorific value required, or as near that figure as possible.

Westminster and the Public Lighting Restrictions.—The General Purposes Committee of the Westminster City Council report that, in accordance with the Council's instructions, representations were made to the Board of Trade urging the necessity for the restrictions on public lighting being removed, so as to enable the Council to revert to the pre-war standard of lighting in those streets of the City which form omnibus routes. The Committee have received a letter from the Board stating that they do not now consider it necessary to limit the discretion of local authorities in regard to the consumption of gas and electricity for public lighting. In view of this concession, the Committee propose that the pre-war lighting be gradually reverted to.

Burnley's New Gas-Works Sites.—The Town Clerk read a letter to the Burnley Gas Committee, from the Secretary of the Local Government Board, relating to the inquiry held by Colonel Ekin in March, with reference to the application of the Corporation for a Provisional Order to enable them to acquire additional lands for gas-works purposes. The Secretary stated that the Board were disposed to issue a Provisional Order which should be confined to the lands which were actually to be used for manufacturing purposes, and that they would be glad to know whether the negotiations with the Lancashire and Yorkshire Railway Company had now been completed. The Deputy Town Clerk reported that he had had an interview with the Solicitor, who stated that the railway company did not desire to re-open the negotiations, but must adhere to the offer already made. The Town Clerk was instructed to inform the Board that the Corporation propose to adhere to their original scheme, and to actually use for manufacturing purposes only the lands referred to in the memorandum of agreement, dated Sept. 17, 1914.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Some Aspects of the Fuel Board Report.

SIR,—In connection with my article in the current number of the "JOURNAL," I note that Mr. Wimhurst, in his Presidential Address to the Eastern Gas Managers' Association, advocates a standard calorific power to be supplied by all undertakings. Surely this would abolish at a stroke the freedom suggested in the report, and would render valueless what we ought to regard as its most valued concession.

Mr. Wimhurst himself admits some of the difficulties in adopting a universal standard—such as the varying coals, &c., available in different localities and the varying use of gas in residential and industrial districts. He omits to mention also the various types of plant at the gas managers' disposal. He further states that these difficulties should not be insurmountable. Probably they are not; but in my opinion they are of such enormous proportions that any attempt would be so troublesome and so costly in the bulk as to nullify all the advantage given us by the report. Let us have a standard calorific power as a charging basis, as suggested in my article, but for use only as a calculating medium. The objection regarding the manufacture of gas consuming appliances can be overcome by means of adjusting sleeves with marked positions, or any similar device.

Later in his address, he sees trouble in arriving at the charge to consumers, and seems to fear the use of conversion tables in regard to its bewildering effect on the consumer. I cannot see any difficulty. In fact it seems to me to be the easiest of all the problems arising out of the operation of the recommendations in the report. The consumer will pay for a unit, whether the unit be fixed at a hundred thousand or one million B.Th.U. Mr. Wimhurst admits that we have at hand the measurement of one factor (the volume) in the form of the present meter. The conversion will naturally be carried out in the gas company's rental department, and will not be a very lengthy operation. Further, I cannot see any magic in the substitution of hundreds for thousands of cubic feet. A brain which is incapable of appreciating the magnitude of a thousand, cannot in my opinion have any clearer conception of one hundred. Considering the actual measure of the average consumer's quarterly account, I should imagine that (say) eleven thousand is, if anything, more easily grasped than one hundred and ten hundreds.

The real difficulty in connection with indexing and collecting will arise with the slot-meters; and the solution of this difficulty will be largely met by uniform composition, or its natural corollary—uniform calorific value. This difficulty will arise whether the charge is made on the unit basis, or by means of a charge per 1000 c.ft., depending on the calorific value.

ENGINEER.

London, May 8, 1919.

The Criticism of the New "Eagle" Gas-Range.

SIR,—We are glad to read in last Tuesday's "JOURNAL" the views expressed with regard to our new "Eagle" gas-range during the British Commercial Gas Association Conference in Reading. It is gratifying that there should have been so great an interest taken in the new departure; and comments and suggestions such as those offered are naturally welcome.

We have pleasure in availing ourselves of the opportunity you kindly afford us of dealing with these; and, in doing so, we may first of all remark that the new "Eagle" gas-range is not a thing hastily constructed. It has taken years of laborious work in designing and testing to produce the apparatus as described in the "JOURNAL" of the 29th ult.; and although the new gas-range has not yet been supplied to the public, a number have been in daily use for some time and have been undergoing the most exhaustive practical tests.

Of the three criticisms by visitors mentioned in the "JOURNAL," all of which concerned the oven, the first is the suggestion that the slide through which the oven-burner is lighted might chance to be left open and the flames come through. Under no conceivable conditions would it be possible for the flames to come through the slots provided for lighting the burner. If by any chance the slide were inadvertently left open, there would be no material difference in the temperature of the oven; and it would not affect the cooking. But by closing the slide in accordance with the instructions cast upon it, the great advantage is retained which we have aimed at and achieved in the "Eagle" gas-range—namely, bottom heat and uniform heat throughout the oven, attained by means of a solid sole-plate, enabling the cooking to be done from the very bottom of the oven right to the top, which cannot be done in any other gas-cooker.

As regards the second suggestion—*i.e.*, that there being (when the slide is closed) no visible indication of the jets being alight, the burner might (through carelessness or haste) be left on and waste of gas take place, a glance at the oven-tap lever, which is distinctive both in position and shape, reveals whether the gas is turned on. But really, at this time of day, it is difficult to take seriously this objection to invisible flames. The arrangement has long been a common one in various types of gas apparatus now in daily use. We ourselves and others have for years made cooking and warming apparatus in this way; and in other countries the ordinary practice for many years now has been to have the ovens of gas-cookers with invisible flames.

The third view expressed is that, the oven being somewhat reduced in height owing to the presence of the solid bottom, it would be necessary when baking a fair-sized joint to have a pan on the solid bottom, or in close proximity to it, to catch the dripping. This misapprehension could only be due to a failure to read the instructions, which are quite clear. Under no circumstances should anything be placed on the cast-iron solid bottom. There is a grid provided, which rests on the solid bottom; and the instructions direct that the meat be placed in an ordinary roasting tin (the same as in a coal range) and set upon this grid, when it will be found that it is cooked perfectly. There is no

boiling, evaporating, or burning of the dripping, any more than in the most efficient coal-range ovens. In these matters, we have been guided throughout by our wide experience not only with gas cookers but with our well-known "Eagle" coal range.

We are satisfied that the public will quickly grasp the new features of the "Eagle" gas-range; and so soon as they have done this they will find that they have an apparatus which is not only much ahead of any predecessor in gas economy, but that its convenience and efficiency as a roaster and baker will be something quite new in their experience.

JOHN WRIGHT & COMPANY.

Essex Works, Birmingham, May 9, 1919.

Gas-Meter Repairing.

SIR,—Although it is an unwritten law that the address of the President of the Eastern Counties Gas Managers' Association is not open to discussion, I would ask an opportunity to make a few observations on one paragraph in the address: "A New Type of Meter Wanted."

With regard to the stock which Mr. Wimhurst finds it necessary to carry, may it not be that this increase is caused by the accumulation of repairs over the last five years? May I also venture to express the opinion that when the present accumulation is dealt with, the average number of meters will not in future exceed the average number in the past, unless for their own protection gas undertakings should decide that it is advisable to carry out more frequent exchanges and repairs, with a view to reducing the quantity of unaccounted-for gas. I cannot express any opinion as to the financial result of doing this; but, with the present price of gas, it is conceivable that a reduction in the unaccounted-for gas would lead to a saving far greater than the cost of carrying-out additional meter repairs.

With regard to the long period taken over repairs, the difficulty that had to be faced during the war (which still in a measure continues) in obtaining an adequate supply of labour and material, is the reason for the serious delay which gas undertakings have experienced. It should be put on record that meter makers fully appreciate the forbearance of their customers at the very inadequate services they have been able to give, owing to causes beyond their control.

Mr. Wimhurst remarks that the tin-cased dry meter no longer appears able to stand-up to the demands made upon it. This general statement should in my opinion be modified. As your readers are aware, a Joint Committee of the Institution and the Gas-Meter Makers has been sitting for some time; and I think it has been conclusively proved that, under proper conditions and with more frequent attention, the tin-cased dry meter will give in the future, under normal conditions, the satisfaction which it has given in the past.

There is no doubt that the continual over-working of meters for short periods is one of the contributory causes; but unquestionably the principal cause is the change in the nature of the gas. I should like to express the opinion that much of the trouble which gas undertakings have experienced, not only with meters but with their mains and services, is due to the extraction of benzol and toluol and similar constituents of the gas which were formerly carried right through the meter and burnt.

I am of opinion that these benzol and toluol vapours acted as carriers, and that their removal has resulted in the "coming-down" in the mains and meters of constituent parts of gas as distributed under war conditions, which attack the metal and leather surfaces of mains and meters. This trouble is probably intensified by the over-taxing of works' capacity in condensers and purifiers.

In addition to the solvents and sulphur compounds to which Mr. Wimhurst refers, I think it will also be found that cyanogen compounds that are apparently prevalent in greater percentages now than in former years are deposited in meters, as the diaphragms and sheet-metal cases form almost ideal means of condensing these products.

It is significant that in the following paragraph Mr. Wimhurst refers to naphthalene stoppages; and, although this constituent (apart from any physical blockage) cannot, so far as I can tell, interfere with the functioning of the meter, it is conclusive proof to my mind that other constituent parts of the gas can be thrown down.

Mr. Wimhurst refers to the meter as being a "piece of hermetically sealed tin and solder" and as a "'box of tricks' which is not strictly speaking an 'engineering job.'" From the conditions under which it works, and the comparatively small motive power which is available (as little as possible of which must be absorbed), it is difficult to conceive a positive measuring apparatus which radically differs from the principles of the present type of dry gas-meter—wet meters, of course, being excepted.

I have often felt that it is too little realized that a gas-meter, which is a very delicate instrument, is the only instrument which may be tucked-away in a corner in a hot or cold place, or even exposed to the weather, and which not only cannot have any of its functioning parts lubricated but also cannot even have them cleaned.

While the requirements of the Sale of Gas Act, and any modifications which can be foreseen, have to be complied with, the meter must be hermetically sealed. Unless each gas undertaking can arrange in its own town for the testing and stamping of meters by statutory authorities, it is hard to see how a meter can be made more easily accessible for interior repairs or constructed with more easily detachable parts.

If the components which measure the gas were interfered with, they would at any rate have to be removed for stamping or the cost of stamping and testing the meter *in situ* would have to be faced; and it is probable that this would cost more than to carry out repairs under the present procedure.

I trust Mr. Wimhurst will forgive me for offering these few remarks on his address. I should like to assure him that meter-makers would be only too glad to co-operate in any way to give the gas industry improved types of meters or meters made of different material should it be found commercially possible. We welcome criticism, as it will undoubtedly lead to improvement in the humble services which have been rendered to the great industry of which we are proud to think ourselves a small component part.

THOMAS GLOVER.

Gothic Works, Upper Edmonton, May 7, 1919.

Manufacture of Neutral Sulphate of Ammonia.

SIR,—As this is a subject of considerable importance at the present time, the article on p. 245 of the "JOURNAL" for April 29 prompts me to address a communication to you on the subject.

When describing the equipment of the Granton works in the columns of the "JOURNAL" some years ago, I mentioned that a hot water spray was employed to reduce the percentage of the acid in the salt as it was discharged into the baskets from the centrifugal machines.

As recently as December last, a fresh series of experiments was carried out, in order to determine whether the substitution of the hot ammoniacal liquors coming over from the heaters would be more effective than the water. This was found to completely neutralize the acid in the salt. But there were disadvantages associated with its use; and the conclusion at which we arrived was that it would be more efficacious to use hydrate of ammonia, and that a little more than 2 gallons per ton of salt was necessary to completely neutralize the acid content in the salt.

I have not had an opportunity of referring to Mr. Sheard's specification; but I shall be interested to know that he has succeeded in completely neutralizing a sulphate by the application of hot or cold water before the process of drying is brought about.

I enclose the details of our experiments, which you may or may not consider of service.

W. R. HERRING.

Howard House, Arundel Street, Strand, May 6, 1919.

[ENCLOSURE.]

FREE ACID IN THE GRANTON MAKE OF SULPHATE OF AMMONIA.

Experiments made with the spraying of fresh-made sulphate of ammonia with: (1) Hot clean water, (2) hot raw ammoniacal liquor, as per Mr. Herring's letter, dated Nov. 13, 1918, also verbal instructions made later.

1.—HOT-WATER EXPERIMENT, MADE NOV. 19, 1918.

Conditions of Working.

As soon as approximately 5 cwt. of the salt was injected into the basket of the centrifugal drying machine, hot water (nearly at the boiling point) was sprayed through a rose on to the whirling basket. The centrifugal was then whizzed at a fast rate for the usual twenty minutes, when the salt was examined for free acid and for appearance. The results were:

	Weight of Dose. Approximate.	Time of Spraying. Minutes.	Water Used. Gallons.	Free Acid in Dried Salt. Outside. Per Cent.	Inside. Per Cent.	Average. Per Cent.
First test	5 cwt.	2	8·6	·172	·343	·257
Second Test	5 ,,	3	12·9	·451	·490	·470
Third Test	5 ,,	4	17·2	·221	·368	·295
Mean of three tests				·281	·400	·341

The appearance of the whole average of the charge showed it to be slightly darker than the usual make; and it was not nearly so dry.

On the outside layer of the salt, it appeared to be whiter than usual, as if some of the insoluble impurities had been driven further back into the salt.

2.—EXPERIMENT MADE WITH SPRAYING WITH HOT RAW AMMONIACAL LIQUOR—NOV. 25, 1918.

Conditions of Working.

When approximately 5 cwt. of the wet sloppy salt was injected into the basket, raw ammoniacal liquor taken from the outlet of the heaters at a temperature of about 182° Fahr. was sprayed through a rose on to the whirling basket. The centrifugal was then whizzed at a fast rate for the usual twenty minutes, when the salt was examined and discharged. The following were the results:

	Weight of Dose—Approximate.	Time Spraying. Minutes.	Ammoniacal Liquor Used. Gallons.
First experiment W.	5 cwt.	3	9·99
Second ,, E.	5 ,,	4	9·36
Third ,, W.	5 ,,	5	16·65
Fourth ,, E.	5 ,,	8	18·72

Analyses of the Dried Washed Sulphate of Ammonia from the Four Experiments.

	First.	Second.	Third.	Fourth.
Appearance	Very dark grey... Granular Crystal. Slightly Damp.	Very dark grey.. Granular Crystal. Slightly Damp.	Very dark grey.. Granular Crystal. Slightly Damp.	Very dark. Granular Crystal. Slightly Damp.
Odour.	Strong Phenol.	Strong Phenol.	Strong Phenol.	Strong Phenol.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	2·310	2·120	1·140	2·280
Free acid (H_2SO_4)	*Nil*	*Nil*	*Nil*	*Nil*
Prussian blue	0·046	0·031	0·037	0·061
Phenol	Traces	Traces	Traces	Traces
Sulphate of ammonia	97·185	97·350	98·340	97·416
Matter unestimated	0·459	0·499	0·483	0·243
Ammonia	25·033	25·075	25·33	25·092

Summary of the Foregoing Experiments.

First.—Washing with hot water reduced the free acid by 43 p.ct.; and its appearance is somewhat deteriorated. It is very difficult to get the salt removed from the basket.

Second.—Washing with hot raw ammoniacal liquor neutralizes all the free acid present, but leaves the salt with crude impurities present. The smells given off while neutralizing would be a nuisance to men working over the machines. As in the case of washing with hot water, it is very difficult to get the salt out of the drying machine—being set in a hard fashion.

The following figures may be of interest in looking into this problem:

Mother liquor in saturators—free acid, 9·07 p.ct. of H_2SO_4
Granton sulphate contains (say) 0·6 p.ct. of H_2SO_4
5 cwt. dose (560 lbs.) contains 3·36 lbs. of H_2SO_4, which requires theoretically 1·17 lbs. of NH_3 to neutralize.

Our raw liquor last analysis was:

	Pounds of S/A.	Pounds of NH_3.
100 gallons	60·258 ..	15·521
1 gallon	·60258 ..	·15521

Therefore to neutralize the free acid in one charge of the dried sulphate there will be required, of the above liquor, 7·54 gallons. To neutralize the free acid in a make of 2500 tons per annum would require 75,400 gallons of the raw liquor. Suppose a hydrate of ammonia was used, testing 25 p.ct. of ammonia, the following quantities would be required:

5 cwt..	0·514 gallons.
2500 tons.	5140 gallons, or 20 tons 18 cwt.

A Gas Supply Film for Cinemas.

SIR,—The Public Press is used not infrequently to ventilate the grievances (real and imaginary) of consumers of gas. A reply is rarely made—perhaps because a defence is regarded as giving undue importance to the criticism.

But surely no harm could result to the industry if public opinion were more clearly and fully informed upon the numberless claims which it has upon the gratitude of all classes of the community. Could there be any more direct method of accomplishing this than through the cinema? Other industries—notably shipbuilding and engineering—are thus brought prominently before the public eye; and the films are both educational and informative.

The invention and improvement of gas, its application and progress, surely constitute one of the greatest industrial romances of our time—of all time; and a treatment of the subject in all its varied aspects is (one imagines) possible which would make a photo-film that should be not only informing and educational, but supremely interesting.

It is, perhaps, the more desirable now, in view of the enthusiasm being displayed in some quarters for the "all-electric" way.

I may be forcing an already opened door; but I have not heard of the existence of such a film already. FRED. G. THOMAS.

8, *Tennyson Road, Bath, May* 6, 1919.

P.S.—It should prove to be also a support to the gas salesman.

REGISTER OF PATENTS.

Horizontal Retorts—No. 125,189.

TOOGOOD, H. J., and ROBERT DEMPSTER & SONS, LTD., of Elland.

No. 4203; March 11, 1918.

The object of this invention is to secure the "more economical and efficient heating of horizontal retorts, wherein (as compared with existing practice) a high retort temperature is maintained with the minimum consumption of fuel, and an improved ignition, forming a well-shaped flame, which is more fully controlled and its products better regenerated than heretofore." Impinging and cutting actions are also reduced.

In order to obtain the best results from the fuel consumed, the patentees point out that the usual independent combustion chamber is replaced by vertical annular burners, so that a parallel flow and less violent ignition will be produced, and the correct shaped and steady flame is constrained to flow round the retorts. Thus for a given temperature applied to the retorts, the still higher temperature usually associated with the combustion chamber is non-existing, with all-round advantages in the uniformity of heating throughout the setting, reduced consumption of fuel, and reduced stress on the refractory materials.

Improved control is obtained by dividing the lengths of the retorts into zones, so arranged that, after the flame of combustion is practically complete, the products from the series of burners in each zone shall intermingle, and the carbon monoxide be thoroughly consumed within the setting for the purpose of ensuring economy. Each zone is provided with a separate waste-heat and secondary-air compartment of the regenerator, whereby the producer gas or carbon monoxide can be controlled by the waste-heat zone damper; and, as the secondary air is controlled at its ingress, all controls are readily accessible, in comparatively cool parts within easy reach, and where they cannot be interfered with by fluxing.

The inventors state that they are aware that it is not new to heat retorts by means of vertically flowing streams of heating gases, also that it has previously been proposed to bring the streams of producer gas and air into contact with each other through inclined ducts, so that they impinge angularly upon each other at the moment of ignition—for example, in small combustion chambers formed under the inspection arches of the stay walls of the setting. But while they do not claim the absence of a separate combustion chamber as a novelty, they believe the delivery of the air and producer gas from parallel apertures which direct the stream of gases up the sides of the retort to be new and productive of economy of fuel as described.

They proceed to describe the invention with reference to five sheets of detailed drawings—noting that while the drawings incidentally illustrate several features which in themselves are old and well known, and other matters which may be considered merely as matters of design and are not claimed as being any parts of their invention, they consider it desirable to give a full description of the setting shown in order that the drawings may be understood.

Gas-Heated Furnaces—No. 125,258.

KING, J., GREGSON, W., and TAUDEVIN AND GREGSON, LTD., of Sheffield.

No. 7832; May 10, 1918.

In gas-heated oven-furnaces as usually constructed the flame and hot gases pass from the burners in the bottom of the furnace through vertical and horizontal passages under the slab or slabs forming the floor of the heating chamber, and up the passages at the sides. It is found in practice, the patentees state, that there is a tendency for these last-mentioned passages to become choked with debris—such as metallic scale, dust, and other matter. To obviate this "undesirable tendency," the practice has been adopted of placing upstanding tiles at the edges of the slab or slabs so as to protect the side gas-passages. This arrangement, however, has not proved wholly satisfactory, as the tiles are liable to get broken, or to crack and break up. Their object is to provide means for obviating this tendency by the introduction of specially formed blocks, with passages through them, between the sides of the slab floor of the heating chamber and walls.

Stripping the Illuminants from, and Purifying, Coal-Gas by Charcoal—No. 125,253.

SODDY, F., of Aberdeen.

No. 7698; May 8, 1918.

This invention relates to a method of treating coal gas to separate the illuminants from the non-illuminant hydrocarbon and other gases obtained by the carbonization or destructive distillation of coal and other fuels, oil-bearing minerals, and the like.

The method is based on the power of charcoal to absorb the illuminants at ordinary temperature; the patentee remarking that, although it has been shown by Sir James Dewar [Patent No. 13,638 of 1904] that by passing coal gas through charcoal cooled to -80° C., the gaseous hydrocarbons are absorbed and separated from the hydrogen and carbon monoxide, it has not been known that when the charcoal is not cooled an absorption and separation of the illuminants occurs to an extent which renders possible an industrial process for the substantial isolation of ethylene.

Having studied the behaviour of charcoal towards coal gas, the inventor is able to say that, at ordinary temperatures, one ton of charcoal serves to remove the ethylene from 10,000 c.ft. of coal gas of average composition. Absorption ceases when the ethylene amounts to rather more than 1 p.ct. by weight of the charcoal, or (by volume) about 300 c.ft. of ethylene per ton of charcoal. After condensation of the vapours of liquids by a condenser, the volume of gases expelled by heating the charcoal saturated in a stream of coal gas is usually of the order of 1000 c.ft. per ton of charcoal, and comprises, as a rough average, one-third ethylene, one-third other illuminants (such as ethane and propylene and their higher homologues), and one-third other gases. About one-tenth of the proportion of charcoal required to absorb the ethylene will generally suffice for completely stripping the benzene and liquid illuminants from coal gas; and charcoal will absorb benzene from coal gas which has been already stripped of this constituent by the process of scrubbing with oil as usually practised. Indeed, from such gas the absorption of benzene will continue until the charcoal contains 10 to 15 p.ct. of its weight of benzene. Constituents intermediate between ethylene and benzene in volatility are absorbed by charcoal to an extent intermediate between ethylene and benzene; so that the weights absorbed in proportion to the weight of charcoal are intermediate between the weights of ethylene and benzene absorbed.

In carrying out the invention, coal gas, preferably previously purified when necessary, is passed through charcoal not cooled substantially below the ordinary temperature, and the charcoal is subsequently heated to expel the absorbed constituents. The invention also includes a method by which the process may be made continuous, and which depends in part on the known principle underlying methods of scrubbing generally—namely, that continued passage of the gas causes displacement of the more volatile constituents first absorbed by the less volatile constituents as these accumulate in the scrubbing agent. The process also depends on the well-known fact that the expulsion of a dissolved or absorbed gas by heat is aided by diminishing the partial pressure of the gas in the atmosphere surrounding the solvent or absorbent. Thus, by heating the charcoal that has absorbed illuminants in a stream of coal gas (or better, of the already stripped coal gas), the charcoal may be, so to say, washed easily from the less volatile constituents which it has absorbed, before it is cooled for re-use in the process.

Whatever the mode of treating the coal gas with charcoal to absorb the illuminants, sulphur compounds—such as carbon bisulphide and sulphuretted hydrogen, should first be removed from the gas. The sulphur compounds are absorbed by the charcoal effectively; but the charcoal deteriorates in absorbing power when unpurified gas is used. It is also of advantage that carbon dioxide and water vapour should be removed, as representing useless diluents subtracting from the efficiency of the charcoal as an absorbent of illuminants. Hence the process is best applied to gas which has undergone the usual purification process for the removal of these impurities. But still further purification is desirable when the separation of the more volatile illuminants—particularly ethylene—is the main object of the treatment. As already stated, the ethylene is displaced from the charcoal as benzene accumulates; and the charcoal is so efficient in removing benzene that, even though the gas has already been subjected to a process for stripping the benzene from it, there should be a preliminary treatment with charcoal for completing this purpose. The intermittent process is well adapted for such preliminary stripping, and may therefore be used with advantage in conjunction with the continuous process.

The intermittent process for preliminary scrubbing or stripping may resemble the usual methods of purification. The scrubber may be taken out of the sequence when saturated, heated to expel the benzene through a condenser, cooled, and put back in counter-current order. The benzene begins to be expelled from the charcoal when the tem-

perature attains 100° C. or less; but a temperature between 300° and 400° C. is required for its complete expulsion.

Whether the intermittent or continuous process be used for removing ethylene and the like, a short cycle with rapid heating and cooling is desirable. The temperature for expulsion is somewhat lower than that for expelling benzene; but an occasional slower cycle, with increased heating, may be desirable to preserve the charcoal from deterioration. For fairly complete scrubbing, a period of three to five minutes' contact between gas and charcoal is ample; but with good charcoal this period can be considerably reduced without much ethylene escaping absorption. On account of the low thermal conductivity of charcoal, layers to be quickly heated and cooled must be as thin as is practicable. A layer of about 4 in. thick is about as small as can be practically used. Greater thicknesses should be stirred during heating and cooling.

To illustrate the intermittent process, the patent specification—extending to some twelve pages of print—is accompanied by two sheets of detailed drawings.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for May 7.]

Nos. 10,450—11,116.

ANDERSON, F. A.—"Furnaces for distillation of coal, &c." No. 10,624.

BESWICK, W.—"Destructive distillation of solid fuels." No. 10,883.

BRADY, N. P. W.—See Anderson, F. A. No. 10,624.

BRITISH THOMSON-HOUSTON CO.—"Automatically removing gases." No. 10,770.

BROUGH, W. H.—"Means for holding globes, shades, &c., on galleries of gas lights." No. 10,792.

COUNE, G.—"Gas washer and purifier." No. 10,713.

CRAIG, G.—"Recovering potash and other salts from glass-furnace gases." No. 10,836.

DEACON, M.—See Anderson, F. A. No. 10,624.

FURLEY, J. W.—"Gas-meters." No. 10,886.

GENERAL ELECTRIC CO.—See British Thomson-Houston Co. No. 10,770.

HEATH, A. W.—See Brough, W. H. No. 10,792.

HERSEY, M. H.—"Gas-stoves." No. 10,966.

JONES, W. H.—"Inverted incandescent mantle grip." No. 10,908.

MARKS, E. C. R.—"Continuous distillation and fractionation of crude benzols. &c." No. 10,864.

RAMBUSH, N. E.—See Beswick, W. No. 10,883.

SOC. FRANCO-BELGE DE FOURS À COKE.—See Marks. No. 10,864.

STEPHENSON, G.—"Dealing with acid sludge produced in purification of benzol, and recovering benzol and sulphuric acid therefrom." No. 10,918.

WALMSLEY, C. H.—"Pipe joint." No. 10,693.

A Presentation at the West Greenwich Gas-Works.

Last Wednesday week there was an interesting gathering at the West Greenwich station of the South Metropolitan Gas Company. Captain J. Ricketts, R.E., who has been in charge of the anti-gas establishment at the works for the last two years, was presented by Mr. H. Colebrook (the Engineer), on behalf of the workmen, with a solid silver cigarette case and a case of pipes. Mr. Colebrook said the work had now come to an end, and the men desired to give Captain Ricketts some recognition of their respect and esteem for him and to thank him for his unfailing tact and courtesy. Mr. J. Simmonds (the workmen's representative on the Co-Partnership Committee of the Company) and Messrs. H. Croucher and G. King (foremen) having added their testimony, Captain Ricketts, in acknowledgment, said that, during the two years they had worked together, the men and women had shown unswerving loyalty. They had passed through most critical times; but all had risen to the urgency of the call for respirators made by Russia, Italy, and America. The 300 men and 70 women at the works were asked to increase their output of charcoal by over 800 p.ct.; and it was accomplished by continuous working for 84 hours per week and on Sundays, without any respite and without a murmur. Had they been asked to make it 1000 p.ct., they would have done it, and risked their lives in the effort. At the time every third week they produced sufficient activated material for a million respirators, which very quickly stopped the "rot" on the Italian front. Every particle of charcoal had passed through their hands in some form or another. When the work was started, he had doubts as to the success of the effort; but it had been proved successful. The people of the neighbourhood had not made a single complaint as to the smoke nuisance, believing that it was incense rising to ultimate victory. The work had been accomplished without threats on either side. There was no talk of strikes; and they concluded their labours bearing the deepest respect for each other. Concluding, Captain Ricketts said that charcoal had been the most effective agent for literally swallowing up all poison gases known.

Nottingham Gas Profits.—The Nottingham municipal authorities find themselves driven this year to again increase the rateable burdens to the extent of 3s. 2d. in the pound—thus bringing up the total rates to 13s. As upon previous occasions when the Municipality has found itself in an unenviable financial plight, the profits of the gas undertaking are to be largely laid under contribution; £30,000 being promised in relief of the municipal burdens. A similar amount is to be forthcoming from the Tramways undertaking; the joint contribution representing the equivalent of 1s. in the reduction of rates. Both Committees have thus aided materially in the alleviation of burdens which are increasing at a rate annually that gives cause for grave consideration. It has been more than once indicated locally of late that it will be impossible to defer a further addition to the present charges for gas.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Examiners certified that the further Standing Orders applicable to the Bournemouth Gas and Water Bill had been complied with.

The Select Committee appointed to consider the Huddersfield Corporation Gas Bill and the Newark Gas Bill reported that no parties had appeared in opposition; and the Bills were committed to the Unopposed Bills Committee.

A petition has been presented by the Poole Corporation against the Bournemouth Gas and Water Bill.

HOUSE OF COMMONS.

Progress of Bills.

The Examiners reported that in the case of the Stourport Gas Bill the Standing Orders had now been complied with; and the Bill was ordered to be read a second time.

A Gas and Water Provisional Orders Bill (Elstree and Boreham Wood Gas) was presented and read the first time.

The Hartlepool Gas and Water Bill was read the first time.

Hornsey Electricity Supply.

Mr. KENNEDY JONES asked the President of the Board of Trade whether he was aware that, under the Temporary Increases of Charges Act, 1918, the Hornsey Town Council applied some months ago for an order to permit them to increase the maximum charge for electric light from 8d. to 10d. per unit; that the Board were withholding their consent, and were pressing the claims of a private electric light company to supply the Corporation in bulk, despite the fact that the Corporation are adequately equipped with ample reserves of plant, and that proposals for a national scheme of bulk supply were now under the consideration of the Government; and would he explain why the Board, in connection with matters relating to electrical undertakings, put forward, at the suggestion of men who are directors or employees of some of the large electricity companies, the desirability of corporations obtaining bulk supplies from private companies pending the production of the Government scheme.

Sir A. GEDDES replied that the Town Council applied for an Order at the end of January last. After consideration of the circumstances of the case, the Boarn oecided to defer giving a decision until the results were known of the operation of the undertaking for the quarter ended March 31. This information had not yet been supplied. The Board also inquired whether the Council had considered the question of taking a supply of electricity in bulk from the North Metropolitan Electric Power Supply Company, or from any other source. There was no ground whatever for the suggestion contained in the latter part of the question. The inquiry in the Hornsey case was made solely on account of the Council's high working costs. Subsequently the North Metropolitan Company addressed a letter to the Board of Trade indicating their readiness to discuss terms with the Council for a supply of electricity in bulk. A copy of the letter had been sent to the Council for their observations in connection with the inquiry previously addressed to them.

Mr. JONES asked if it was not a fact that on the Electricity Power Supply Committee there were representatives of vested interests, and was it a desirable arrangement that these representatives of vested interests should have any control of the policy of the central authority in regard to representations made to local corporations?

Sir A. GEDDES remarked that there was surely a misunderstanding in the matter. This was the policy of the Board of Trade; and the policy of the Board in this matter was inspired by the high working costs.

Gas-Works and Benzol Production.

Mr. JOYNSON-HICKS asked the President of the Board of Trade how many gas undertakings were supplied with gas-scrubbing apparatus; and whether, in view of the great value to industry of producing a larger supply of benzol in this country, he would take steps to ensure that all gas undertakings were fitted up with such plant at an early date.

Sir A. GEDDES replied that he understood that of the 1577 gas undertakings in the United Kingdom 186 had installed oil-washing plants and 600 tar-washing plants for the production of benzol. The Board of Trade have no power to compel gas undertakings to provide themselves with such plant.

Gas and Electric Light Rationing.

Mr. GILBERT asked the President of the Board of Trade if any decision had been come to by his Department regarding the rationing of gas and electric light in London and the South of England, and if he could state whether the present rationing would be abolished, and from what date.

Sir A. GEDDES replied that the matter was under consideration, and it was hoped to give a definite reply by the end of the present month.

Housing Schemes and Electric and Gas Appliances.

Captain MARTIN asked the President of the Local Government Board whether information could now be given for the guidance of local authorities and others engaged in the preparation of housing schemes as to the probability of cheap electricity and gas being available in the near future, so as to enable the latest appliances for cooking, heating, lighting, and hot water to be provided in the proposed new houses, and thereby effect a reduction in the cost of construction of such houses by the omission of fireplaces and chimney-stacks, as well as securing the advantages in the home of the latest practical methods of cooking, heating, and lighting.

Major ASTOR replied that the provision of central hot water supply

and other labour-saving devices and appliances was considered by a Committee of the House and the Women's Housing Sub-Committee appointed by the Ministry of Reconstruction. The recommendations of these Committees were being borne in mind. He was arranging for useful suggestions to be investigated, and any practical proposals submitted by local authorities in connection with their housing schemes would be encouraged. He could not, however, state what the cost of gas and electricity was likely to be in the near future.

Coal and Light Rationing Order.

Major G. PALMER asked the President of the Board of Trade whether he proposed to modify the Coal and Light Rationing Order; and, if so, to what extent.

Sir A. GEDDES replied that it was hoped that it would be possible to relax the administration of the Order from June 30 next. The matter was now under consideration; but the decision must depend upon the extent to which the output of coal might be increased in the interval. Although supplies of coal for household purposes were now somewhat in excess of actual consumption, in consequence of the warmer weather, the first task would be to secure reserves sufficient to guarantee the future distribution.

STOCKSBRIDGE GAS BILL.

This Bill was before the Unopposed Bills Committee of the House of Commons on Thursday last.

Mr. BROWNE (Messrs. Dyson & Co., Parliamentary Agents) said the object was to incorporate the Stocksbridge Gas Company to supply gas in the urban district of Stocksbridge and part of the rural district of Wortley. The case was unique, because it was not proposed that the Company, at any rate for the present, should erect gas-works or manufacture gas. There was in Stocksbridge a very large steelworks owned by Messrs. Samuel Fox & Co., Ltd., who made and used coal gas, and had also recently installed a number of coke-ovens. The Steel Company had supplied the urban district of Stocksbridge with coal gas; but in January last the manufacture of coal gas was discontinued, and the supply had since been maintained by coke-oven gas. The Company now proposed to take a supply of coke-oven gas from the Steel Company; and they were probably the first promoters who had come to Parliament with a scheme by which it was not proposed to supply coal gas. The standard suggested was 400 B.Th.U. At the same time, the hope was that a higher quality would be supplied normally; but the promoters did not feel justified in putting a higher figure than 400 B.Th.U. in the Bill. The Company had entered into an agreement with Messrs. Fox & Co. for a period of seven years to take such gas as was required for the needs of the district at a price which would vary with the current price of coal. The price agreed upon was 1-20th the price of coal per ton ruling for the time being per 1000 c.ft. Thus it would not be necessary for the Company to incur a large capital expenditure. The capital proposed was £7000 original capital, representing the value of meters, &c., in the district which would be transferred to the Company, and additional capital of £32,000. Of the latter sum, however, not more than £8000 would be expended unless the Company has to erect gas-works of their own. Taking the cost of coal at 25s. per ton—viz., 1s. 3d.—it was estimated that the Gas Company would supply gas at 2s. 6d. per 1000 c.ft. Mr. Woodall, who had advised the Company, would tell the Committee that coke-oven gas at 2s. 6d. per 1000 c.ft. would be equivalent to coal gas at 4s. 6d.; so that it was distinctly a cheap gas. Apart from this, of course, it was the only form of gas available. A maximum price of 5s., however, was asked, to cover the contingency of having to put up works to manufacture coal gas. In part of the district covered by the Bill the Sheffield Gas Company had powers to supply. But they never had supplied; and their mains were still a long way from the district. The Stocksbridge Company would give a supply in that portion of the area as long as the Sheffield Company agreed.

The CHAIRMAN (Mr. Whitley) said there was nothing in the Bill to prevent the Company from charging 5s. for gas which they said they could supply at 2s. 6d.

Mr. BROWNE: It is necessary to have a maximum.

The CHAIRMAN said the Committee would have to be satisfied on the point that whereas the normal standard was 500 B.Th.U., the proposal was to supply gas with a calorific standard of 400 B.Th.U. At the same time, what appeared to be a high maximum price was being asked for. Coal should be cheap in Yorkshire.

Mr. BROWNE said that if the price of coal was 20s. per ton, the price the Company would pay for gas would be 1s. per 1000 c.ft., and the charge to the consumer would be correspondingly lower.

Mr. *Harry Woodall* said the Company would keep the calorific value as high as possible; but they could not be sure that it would be 500 B.Th.U.

The CHAIRMAN asked the witness that, assuming 500 B.Th.U. gas was worth a maximum price of 5s., what would be the figure applied to 400 B.Th.U. gas?

Mr. *Woodall* said that, compared with coal gas at 500 B.Th.U., the value of 400 B.Th.U. gas would be 3s. 4d. per 1000 c.ft. The average price of gas now charged by companies supplying gas within fifty miles of Stocksbridge, and manufacturing from 1,500,000 to 2,000,000 c.ft. per annum, was 4s. 4½d. per 1000 c.ft.

The CHAIRMAN suggested that, if the Committee granted the 400 B.Th.U. standard, the maximum price would have to be 4s., or 5s. for a 500 B.Th.U. gas.

Mr. *Woodall*: I should be inclined to advise my clients to accept that.

The CHAIRMAN: You understand what we wish. As long as you are not making gas yourselves, the maximum price will be 4s.; and we allow you a standard of 400 B.Th.U. If you become ordinary producers of coal gas, the standard will be 500 B.Th.U., and the maximum price 5s.

Mr. BROWNE agreed.

The preamble of the Bill was formally proved, subject to the necessary alterations to give effect to the Committee's decision.

LEGAL INTELLIGENCE.

SUCCESSFUL RATING APPEAL BY THE WOKING DISTRICT GAS COMPANY.

At the Surrey Quarter Session, held at Kingston on the 1st inst., the Woking District Gas Company appealed against the assessment of their property for the poor-rate in the parishes of Byfleet and Pyrford.

The grounds of the appeal were that the expenses exceeded the receipts—that is, the Company, as hypothetical tenant, had to take into account what they might probably have to spend during the year, although the rent had to be fixed at the beginning of the year. It is common knowledge that the gas industry everywhere has felt the pressure of hard times, and has not been able to pass on this pressure as has been done in so many other mercantile concerns. In the course of the proceedings remarks were made to the effect that, if the information which the Company's advisers got together had been placed before the Assessment Committee, the appeal might not have been made. But it is well-settled law that an objector is not bound to give to an Assessment Committee any evidence in support of his objection. It, however, transpired from the evidence of the Chairman of the Assessment Committee that the Committee had no information to give; and this places the complaint, if indeed it can be called a complaint, in quite a different light.

At the hearing of the appeal, Sir CHARLES WALPOLE presided over a Bench of Magistrates. The appellants were represented by Mr. HENN COLLINS; and the respondents (the Chertsey Union Assessment Committee) by Mr. R. O. B. LANE.

Mr. HENN COLLINS, in opening the appeal, said the Company, with a capital of £85,000, had never succeeded in earning more than £5000 a year, except in 1917, when they earned £5091. They had never been rated in the parish of Byfleet until the rate now before the Court. For some years the Company had been rated in Woking parish in the Guildford Union, where the assessment did not trouble them much. Counsel proceeded to deal with the principles on which such a concern should be treated; and in reply to the Chairman, he said the Company's assessment for Byfleet was £155 gross, and £115 rateable; for Pyrford it was £30 and £23; in Send and Ripley, £50 and £40; in Pirbright, £122 and £85; in Horsell, £200 and £152; while the parish of Woking was rated at £4110 gross and £1820 rateable. This covered the whole of the Company's undertaking.

Evidence was given for the appellants by Mr. W. G. Cooke, M.Inst.C.E., and Mr. Leonard Askew, while Mr. Dennett Holroyd, the Secretary of the Company, produced the balance-sheets for the two half-years of 1917.

The respondents called Mr. W. H. Eve, who gave evidence in support of the assessment, and Mr. S. W. G. Tringham, the Chairman of the Chertsey Board of Guardians and Assessment Committee. The latter said that at the special meeting of the Committee held to hear objections against the valuations, Mr. Cooke declined to give the Committee any assistance in the case.

The appeal was allowed, with costs.

Mr. LANE said that if the Company had only furnished the Chertsey Assessment Committee with the necessary information at their meeting, there would probably have been no need for the case to have come before the Justices. He did not think, therefore, he was going too far in asking that the appellants should bear the costs of the case.

The CHAIRMAN, after conferring with the other Justices, said they thought that if the information which had been given to them by Mr. Cooke had been given to the Assessment Committee the appeal would probably have not come before them. But the Court did not feel that the appellants, who had succeeded that day, should be deprived of their costs; and they accordingly refused the application.

Rotherham Gas-Works Profits.—The Rotherham Town Council met last Wednesday, when some interesting figures were furnished by Councillor Bingham in moving the adoption of the minutes of the Gas-Works Committee. From 1871 to 1918 the gas-works had paid over £146,217 to the rates, sufficient to extinguish the present net debt, and leave a balance of £25,000.

Twenty per Cent. Discount on Devizes Gas Prices.—At the meeting on the 2nd inst. of the Devizes Town Council, it was proposed by the Gas Committee to allow a further 10 p.ct. on the gas accounts to consumers for the quarter commencing last Christmas—making a total discount of 20 p.ct. The Gas Manager (Mr. W. J. Rendell Baker) reported that, as the result of inquiries, he found that the charges for gas in fifteen towns in the county averaged: Ordinary consumption, 5s. 1d.; power, 4s. 11d.; slot meters, 5s. 9·6d. In Devizes the price of gas is: Ordinary, 4s. 1½d.; power, 3s. 8d.; slots, 4s. 8d. The report was adopted, including the payment of the discounts. Deducting the 10 p.ct. discount thus agreed to, the price of gas to consumers will be from 3s. 8d. to 3s. 2½d. per 1000 c.ft., according to consumption; 3s. 5d. for power; and 4s. 2d. through slot meters. Considerable works of reconstruction were foreshadowed in a report from the Manager.

Heywood Gas Charges.—At a meeting of the Heywood (Lancs.) Town Council on Thursday last a resolution of the Gas Committee to increase the price of gas by 6d. per 1000 c.ft. as from the 31st inst. was objected to by Dr. Jeffery as being illegal. No Committee, he said, had the power to vary the terms in the middle of a quarter; and if the minute was passed by the Council, users of gas would not be bound to pay the charge, nor could they be sued for it. In these circumstances, he moved that the resolution be referred back. Alderman Hesley, the Chairman of the Gas Committee, in the course of the discussion, said the point had been raised in committee. The department would have to pay the price; and if it would not apply in the present quarter, the increase might have to be 8d. per 1000 c.ft. Different views were expressed as to the desirability of passing the minute; but before a vote was taken, Alderman Hesley intimated that he would not divide the Council, and so he withdrew the resolution.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Annual Ordinary General Meeting of the Association was held last Tuesday, at the Cannon Street Hotel, Cannon Street, E.C.—Sir Charles J. Jessel, Bart., in the chair.

The Secretary (Mr. R. W. Wilson) read the notice convening the meeting.

Personal Matters and a Loss.

The Chairman: Ladies and gentlemen, I propose to-day to go through the formal business first; and then to make whatever observations I have as to the position of the Association subsequent to the conclusion of that business. My first resolution is that Sir Henry Birchenough be re-elected a Director of the Association. I have no doubt you will have seen in the notice summoning you to this meeting that one of our number, Mr. Robert Tindall, had resigned. His resignation was occasioned by a painful, and what proved to be a mortal, disease; and he was saved further suffering by merciful Providence on Easter Sunday last. Mr. Tindall had served in the office of Director for upwards of a quarter of a century in the most loyal and efficient manner; and his colleagues will always hold him in sweet and affectionate remembrance. All the Directors are present, except Mr. Arthur Lucas, the Deputy-Chairman, whom perhaps I shall be able to talk about more safely as Sir Arthur Lucas, as a knighthood will shortly be conferred upon him as some recognition of upwards of forty years devoted to the service of charity. [Applause.] A long and trying winter had caused our Deputy-Chairman to seek some repose in the shape of a holiday; and I hope he will come back to us very shortly fully restored to health.

Military Services of Directors

We welcome back to our midst Colonel Le Roy-Lewis, who last October returned, having served for several years in the important post of Military Attaché in Paris. His services have been recognized by the Government, to a certain extent, by the bestowal of C.M.G.; and the French Government have also rewarded him not only with the Legion d'Honneur, but with the Croix de Guerre avec Palmes. Mr. Harold Palmer has also returned to us after several years' service in the army. You will perhaps remember that he was severely wounded in 1916; and, subsequent to that date, he was employed by the Admiralty in a technical capacity, and came back to us two or three months ago. Since I last had the pleasure of meeting you, Mr. Newton, who, though 46 years of age, was called upon by his country for service, joined-up in July, 1918, and served as a private up to quite a recent date. [Applause.]

And of Members of the Staff.

While on the subject of military services, I should like to say that Mr. C. J. Gladwell, our Accountant, whose services we lent to the Government, has come back to us. He was rewarded with the O.B.E.; and before he returned to us he was serving as Secretary of the Sugar Commission. Mr. W. M. Jackson, of the Accountant's Department, who had a frightful wound in the jaw, has also come back, as well as Mr. Harriss—a young man who only joined us just before the war, and who was slightly wounded. I believe I am right in saying that all our staff who joined were either killed or wounded. Mr. F. E. Williams, who had also been lent to the Government, has been tempted by the prospects of higher remuneration elsewhere to desert us. He is no longer a member of our staff. Our staff, which at the outbreak of the war consisted of nineteen men and two ladies, now consists of ten men and three ladies.

Reduced Emoluments to the Board.

I daresay you will remember that I told you in November, 1914, that the whole of the directorate and the staff had their emoluments reduced by 25 p.ct. on the outbreak of war. This applies still to the directorate; and we have not filled up the vacancy caused by the death of Mr. Tindall, which occasions a saving to the Association. The total drawn by the directorate at the present date is £3375, instead of £6000, as in July, 1914. The deduction made with reference to the staff had, owing to the dearness of living, to be made up to them again, and not one member of the staff below the Secretary at December, 1918, suffered from the deduction—in fact, since that date, we have made an appropriate increase in their pay.

Englishmen in Berlin.

The proprietors will, of course, be interested in what happened to the Englishmen on our staff in Berlin. They have all now returned home. Mr. Thompson, our Chief Assistant Engineer, and Mr. Wilson, an Assistant Engineer, have both come back—Mr. Thompson only a few weeks ago; Mr. Wilson some few months ago. Both, I am sorry to say, were much impaired in health by what they went through in Germany. I hope you will not misunderstand me when I say they were much impaired in health from their treatment in Germany, because, though it is difficult for us to think of Germans in other terms than that of the bestial brutality of their behaviour on land, of their callous cruelty at sea, and their innumerable and indefinable atrocities throughout the world, I do not wish you to go away with any thought that these two men suffered at the hands of the Germans in Berlin. What they suffered was in common with their German colleagues and the rest of the civil population in Berlin. There are two foremen of the meter works at Berlin, who have returned. They have both been pensioned; and Mr. Thompson has also been pensioned. Mr. Wilson has been found work at one of our other stations. An assistant foreman, who also returned, has had work found for him at Antwerp. I must now come back to my original motion that Sir Henry Birchenough be re-elected a Director.

Colonel H. Le Roy-Lewis, C.B., C.M.G., D.S.O., seconded the motion, which was very heartily agreed to.

Other Re-Elections.

Sir Henry Birchenough, K.C.M.G., having thanked the proprietors for their continued confidence, said, after the very generous and appreciative way in which the Chairman had spoken of his colleagues and of the various members of the staff, he felt it a privilege to propose the re-election of Sir Charles as a Director of the Association. It was exactly twenty years since he (Sir Henry) joined the Board. For fourteen years he sat as an ordinary colleague of Sir Charles, and for six years it had been his privilege to sit under him as the Chairman. There were few public opportunities of testifying to all that they who sat on that side of the table thought of their Chairman. With twenty years' intimate business relationship with their Chairman, he could assure the proprietors that they had in him, as they (he was sure) must realize, a Director and a Chairman who devoted his whole heart to the service and the interests of the Association, who acquainted himself, and was acquainted, with the most minute details of the business, and was filled with zeal in the cause and interest of the Association. Throughout the war, during which period the proprietors had, after a long period of prosperity, to suffer very acutely from the misfortunes that had overtaken the Association through the war, Sir Charles had had only one thought and desire, and that was to bring the proprietors out of the troubles into which circumstances had precipitated them, and to bring them out with advantage to themselves and honour and success to the Association.

Colonel Le Roy-Lewis seconded the motion, which was enthusiastically carried.

The Chairman said he was quite overcome by the way his re-election had been moved by Sir Henry Birchenough, to whom he tendered his grateful thanks, as well as to the proprietors for having reinstated him as a Director.

On the proposition of Mr. Percy J. Harding, the retiring Auditor (Mr. C. F. Dendy Marshall) was re-appointed.

Services of the Secretary.

The Chairman: In alluding to our staff just now, I did not mention an exception in reference to the 25 p.ct. salary reduction. That exception is our Secretary. Now if I had to say all I feel about our Secretary, I am afraid, though he has got rather a florid complexion, you would manage to see even him blush. I have often talked about his great services to the Association. I have frequently referred in the course of the war to the way, at the risk of his life, he went over to Holland to meet our empowered representatives from Germany; and I do not think anything we can say or do for him would be sufficient. But though—through the rather more restricted area that is in front of us for the operations of the Association—we felt the 25 p.ct. we took off his salary should be permanent, I am sure you will be glad to hear that we offered to him a lump sum which would compensate him for the reduction, both for the past and some years in the future. I shall leave it to my successor in this chair—many years hence I hope—when he speaks in the terms of the obituary notice to say what I should like myself to say further in reference to the services of Mr. Wilson. But I do not wish you to go away thinking that he is less hard worked than he was before the war. The amount of work, now that we have resumed; that the Continent is pouring into the office is as large as, if not larger than, it ever was, and demands a man of the stamp and calibre that we are lucky enough to possess in Mr. Wilson.

A STATEMENT ON THE POSITION OF THE ASSOCIATION.

The formal business of the meeting having concluded, the Chairman proceeded to make a statement regarding the present position of the Association, particularly in regard to

The Sale of the Properties in Germany.

The Chairman: I wish now to tell you something of the position abroad. I will speak of Germany first, because, our chief and largest assets being in Germany, naturally Germany holds the principal field of interest with respect to the liquidation of our assets. I am really frightened to address you on this subject, because I am afraid you will be disappointed from the fact that I have so little to add to what I said on the last occasion I addressed you. The chief point—the point of paramount importance—to all of us is as to how are we going to get these millions of marks for which we have been liquidated in Germany back again into our pockets. I addressed a letter to the Foreign Office, which I am going to read to you; and I will also read its answer—not that we expected much satisfaction even when we sent the letter. But I thought it due to ourselves to ask the Government (they are the only people who can help us) what they are going to do. The letter to the Foreign Office is dated March 18 this year; and it is as follows:

I am requested by my Board to represent to you the extremely difficult position in which, as custodians of the interests of the stockholders of this Association, they are placed by the absence of any indication of the policy of His Majesty's Government in regard to the treatment of claims against the enemy Governments for the seizure of British property in enemy and allied territory.

I submit for your consideration the following facts:

(1) The claims filed by this Association with the Foreign Claims Office, in respect of its property in Germany alone, amount to a total of £11,251,660 9s. 2d.

(2) The stockholders of the Association, who, when the register was last closed, numbered 7322, have, in consequence of the war, been deprived of any return whatever upon their capital since May, 1915.

(3) The combined capital and debenture stock of the Association amounts to a total of £6,094,640. Of this sum more than half is held by women of whom, to the knowledge of my Board, large numbers were, prior to the war, mainly dependent for their means of subsistence upon the dividends received thereon, the loss of which has caused, and is causing, them great hardship and suffering.

(4) Practically the whole of the Association's German assets are known to have been liquidated by, or with the approval of, the German Government, the amounts realized being as follows:

	Marks.
By the sale of the Berlin gas-works, mains, and concession	81,460,630
,, value of working capital—*i.e.*, cash, stocks, and debtors, less creditors	28,473,882.66
,, the sale of shares in the Oberspree Gas Company, Berlin	3,516,171.01
,, the sale of shares in Grünau Gas Company, Berlin	447,383.41
,, the sale of the Hanover gas-works, mains, and concession (exclusive of the working capital, the amount of which at the time of sale has not been reported)	6,000,000
,, the sale of shares in the Deutsche Continental Gas Gesellschaft	1,453,822.50
,, the sale of shares in the Dessauer Verukal Ofen Geseilschaft	125,000
,, the sale of shares in the Frankfort Gas Company	18,826,400
Making a total, exclusive of interest, of	140,303,289.58

which sum (equivalent, at the normal pre-war rate of exchange of M. 20.50 to the pound sterling, to £6,844,063), remains either in the hands, or under the control, of the German Government.

I should like to say here that, since I last had the pleasure of meeting you, there has been the sale of shares in the Deutsche Continental Gas Gesellschaft and in the Dessau Vertikal Ofen Gesellschaft. The shares in the Deutsche Continental Company were bought for us at about 190 marks; and the liquidator sold them for 201 marks. So that, so far as marks are concerned, the investment was not a very bad one. The sale of the shares in the Dessauer Vertikal realized 125,000 marks. In this case, we held the very small nominal amount of 12,500 marks out of 50,000 marks. This stood in our books at the nominal figure of £125; but the cost, including the amount paid out on shares, and the experiments we carried out before we joined the Dessauer Vertikal Gesellschaft, ran up to about £8125. It was a very remunerative investment, because our last dividends were: 1912, £5314; 1913, £4887; 1914, £5768. These, of course, are net amounts which we received in London. So you will understand the 125,000 marks—that is to say, £6000 odd—is only about one-and-a-half year's purchase of the dividends received. Therefore it is not a satisfactory figure. As to the sale of shares in the Frankfort Gas Company, this amounted to 18,826,400 marks. The total proceeds of the sales enumerated came to 140,303,289 marks. I daresay you will remember that on the last occasion I spoke of the sum of 147 million marks. Therefore, it looks as if the sum I mentioned when writing to the Foreign Office is short by some 7 million marks. In the 147 million marks were stocks, &c., at Hanover (of which we could not know anything), and accumulated interest and dividends, of the total of which we are also at present unaware. But I think when we have full accounts of what is owing to us from Germany, you will find the estimate I made last year of 147 million marks is quite within the mark. The letter to the Foreign Office proceeds:

(5) The sum so realized, it will be observed, is very far below the estimated pre-war value of the properties as given in the Association's Statement of Claims referred to in paragraph 1; and it may be regarded as practically certain that even this sum would, by loss on exchange, be further diminished to the extent of at least one-half if it were left to the Association itself to collect, and transmit it to this country after the conclusion of peace.

(6) In the case of this Association, there is no possibility of any eventual resumption of operations in Germany, even were such a course desirable, which I may observe my Board do not consider to be the case. This Association has supplied gas in Germany and in other European countries for nearly 100 years, and has learnt by experience that a service of public utility of this nature can only be successfully carried on with the goodwill and friendly co-operation, not only of the municipalities and general public, but also of the Governments themselves. Any hostility, veiled or open, on the part of the authorities is reflected in restrictive measures and endless technical and legal disputes, from which it is impossible for a foreign company to free itself, and which inevitably render the undertaking unprofitable.

(7) This Association regards its business in Germany, therefore, as definitely terminated by the war, and remains entirely dependent upon His Majesty's Government for securing just compensation for the valuable assets which it has been compelled to abandon to the enemy.

In view of the foregoing I venture to express the hope that it will be possible for His Majesty's Government to make, at an early date, some announcement as to its policy in dealing with the claims of British subjects against the enemy Governments.

On March 26, I received this reply from the Foreign Office:

With reference to your letter of the 18th inst. in which you express the hope that His Majesty's Government will make at an early date some announcement as to their policy in dealing with the claims of British subjects against enemy Governments, I am directed by Earl Curzon of Kedleston to state that the policy of His Majesty's Government in regard to this matter must depend upon the results of the Peace Conference and that it is not possible to make any statement at present.

THE LINDEN PROPERTY NOT LIQUIDATED.

That is all I have to say about the letter and its contents. To refer again to my last year's estimate of 147 million marks. Not only did I, in the statement to the Foreign Office, leave out things which we could not tell them about, but, of course, we could not refer to one of our properties there—that is, our gas-works at Linden, which is the only property in Germany which has not been liquidated. Linden, as many of you know, is next door to Hanover, and is separated from it only by a small stream. All we know about Linden is this. It was put up for sale by the liquidator; and the town of Linden offered for it the ridiculous sum of 700,000 marks (£35,000). The works were built there quite a short time before the war; the Association having concluded a contract with the town up to 1950. The works cost some £150,000; and we spent over £30,000 for other capital purposes. So that, if you translate this at the pre-war value into marks, we have actually spent, without any question of goodwill, between 3 and 4 million marks on Linden. Yet, as I have said, when the Liquidator asked for offers, the town offered 700,000 marks, or £35,000. The liquidator refused this; and the Municipality gradually got up to 1,300,000 marks (£65,000). The liquidator then reported to the German Government that, if he could not get the price up to 1,750,000 marks, he should consider the business off. The German Government then asked our representative over there to say whether we were willing to take the 1,300,000 marks (£65,000) which the town of Linden had chosen to offer, so that the matter could thus be considered closed. We replied, with the leave of the Foreign Office, that we were unable, just as in the case of Hanover, to bargain with them in the matter. We have never yet recognized any liquidation that had taken place. Therefore, if you add the value of Linden to the other assets in Germany, we easily come to the 147 million marks about which I spoke on the last occasion of our meeting.

THE PROPERTY IN AUSTRO-HUNGARY.

That finishes Germany; and I now come to Austro-Hungary. Except some unsold land and freehold property, and money due to us for properties we had sold before the war, we are only interested in Austria in shares in two companies—the Austrian Gas Company and the Wiener Gas Industrie Gesellschaft. The claims that we made to the Foreign Office came to £839,013. We had an offer in December, 1917, from the Lower Austrian Discount Company of Vienna to buy these shares; and they asked us the price we put on them. We replied that we would only sell anything we had in Austria if they made a comprehensive offer to include the shares we owned in the Hungarian Gas and Lighting Company. They promised to make an offer on this basis; but since then we have not heard anything further from them.

POSITION IN BOHEMIA.

I now come, as a separate proposition, to Bohemia. I believe it is still called Bohemia, though it may now be Czecho-Slavonic. Only some three weeks ago we were in communication for the first time with Prague. We have had one letter, containing very little information, from our Manager there—Mr. Friebel; and it took twelve days to get from Prague to London. There is really nothing in the letter of any interest to you as to what happened in Bohemia. The Austrian Government ordered our properties to be liquidated; and the works at Prague were offered to the Municipality. But they made no sign of response; and the matter therefore lapsed. We, of course, have the other small places in Bohemia, though we have heard nothing of them—Komotau, Graslitz, Brux, and Saaz. I have no doubt we shall hear in due course what is going on in these places.

INTERESTING (SOME FARCICAL) INCIDENTS IN BELGIUM.

I now come to Belgium. You will remember the last time I addressed you that I told you the Germans had had what I may characterize as the impudence to liquidate our property in Belgium. The proceeding was quite contrary either to moral or international law. [Hear, hear.] But they did liquidate us. They sold us to a company which was instituted for the base purpose of getting hold of foreign companies in Belgium. It was known as the Belgian Gas, Water, and Electricity Company. These people entered into our office at Antwerp, and dismissed our empowered agent, Mr. Van den Abeele, and they also threw out of office Mr. de le Paulle, our Manager at Brussels. When the armistice came on Nov. 11 they still sat tight. Up to Nov. 16, the German Manager in Brussels was still in the office; and our Secretary there (Mr. Schouten) went and gave him half an hour to clear out. [Laughter.] With the usual German absolute want of any sense of humour, the German Manager left a long written protest against the conduct of the Association's employees in turning him out. Our staff, having thus cleared the office, went down to Mr. de le Paulle's house, and brought him back in triumph to the office in the Chaussée d'Ixelles. As soon as he possibly could, our agent at Antwerp, Mr. Van den Abeele, sent us word that they were there at last free from the enemy who had been strangling them so long. I am sorry to say that, due to his long experience of German rule in Antwerp, the health of Mr. Van den Abeele was much impaired; and he passed away only six or seven weeks ago. For the short time he had been in our service, he had been a most able and loyal agent.

MONEY AND METAL FROM METERS STOLEN BY THE GERMANS.

Though we have our works at Antwerp intact, except for the damage done to them by the bombardment by the Germans in 1914, though we have them restored to us, though in Brussels all three gas-works and the electric stations are in full working order, I do not wish you to go away thinking that things are very comfortable there. The Germans would not allow us to spend any money in keeping-up the works in proper condition; and much will have to be done to restore them to what we call Imperial Continental Gas Association form. Besides this, we have a great deal to charge the Germans with in the way of damage. A certain Dr. Drape was put by the Germans in charge of the Association's interests; and the first thing he did was to go down to our bankers and seize all the money. They stole our money; and he put it into the Deutsche Bank for use by the German Civil Administration. Besides this, during their occupation, they broke open our meters in order to steal the tin and the brass. They took all the copper fittings they could find; they seized and commandeered all the material we had; and generally they conducted themselves like conquering brutes.

CLAIMS IN RESPECT OF BELGIUM.

I daresay you will remember when I gave you the total sum which we put in as our claim for Antwerp and Brussels to the Foreign Office, it amounted in English sterling to £3,226,933. Now, of course, when we have come into our own, this claim is subject to revision. Still, to give you some idea of what we have in the way of claim against the Germans I will read out the bill we have sent in:

Antwerp.

	Frs.
Cash seized (this is what Dr. Drape stole)	6,971,124.23
Goods requisitioned	2,558,515.44
Damage to plant and material	1,086,950.89
Loss of profits during period of occupation	9,744,584.06
Diminution in value of the concession caused by the German occupation	5,384,665.87
Total	25,745,840.49

Brussels.

	Frs.
Cash	6,275,951.58
Goods requisitioned	3,902,287.91
Damage	1,839,645.94
Loss of profits	8,716,150.63
Diminution in value of concession	4,905,819.19
Total	25,639,855.25
Total for both Antwerp and Brussels	51,385,695.74

A DIFFICULT POSITION IN BELGIUM.

What I want to point out to you in respect of Belgium is the difficult situation in which we are. The price of coal is extraordinarily high. It amounts to 84 frs. per ton. There is an enormous increase in the price of other materials. We have had to make, too, an abnormal increase in wages, and to pay large bonuses to the staff and workmen on account of the very great dearness of living. The result is the net cost of manufacture is very largely in excess of the price we are getting for our gas; and the authorities are trying to force the Association to maintain the present contract prices which were in force at the time the war began, thus sustaining great losses in working these stations. We are doing our best both on this side and in Belgium to attain a satisfactory and amicable solution of the difficulty; but up to the present I cannot report any success in this direction. Then, again, the labour question in Belgium is particularly difficult. Labour in Belgium, as in some other countries I have heard of, wants to work shorter hours, at very highly increased pay. Then we have got on the other side the municipalities who, as I have pointed out, refuse to let us increase the price charged to the consumers. Therefore you will be able to appreciate that, though we have come into our own, there is no immediate prospect of a remunerative return on the capital we have engaged in Antwerp and Brussels. I should like to say there is one little silver lining to this black cloud. We have heard in the last few days from Mr. de le Paulle that there is some chance of our getting back some of the money the Germans stole from us. There is, however, again something on the other side. We do not know in what form this money is coming back to us. I daresay you know that Belgium is full of German marks; and if we are to be paid in German marks of very little value, it will not, of course, be a satisfactory exchange. I believe—and Colonel Le Roy-Lewis knows of a concrete case—that the French Government have behaved in quite a different way, and have insisted on any German stealings being repaid in sufficient marks to produce 1·25 frs. for each mark. If the Belgians could only get the backing of the allied Powers, that the Germans should do the same, our situation would be very different. We naturally hope this will be the case.

POSITION IN FRANCE.

Now I have to deal with France. We are only interested in the way of being shareholders in various French companies. Armentières and Estaires are towns that do not exist any longer, nor do the gas-works. I do not suppose till the towns exist again that the Compagnie will go to the trouble and expense of reinstating the gas-works. Lille, so far as the gas-works are concerned, is entirely untouched. That position we owe entirely to the energy of Mr. Couvreur, who is the head of the Wazemmes Gas Company at Lille. He, with the assistance of the Mayor of Lille, went to see the German officer in charge, after the Germans had made emplacements for mines in the retort-house and gasholders of the works. Everything was ready for them to be blown up before the Germans left the town. However, Mr. Couvreur and the Mayor prayed the German officer to telephone to the German headquarters to ask whether or not the works were to be blown up. The German headquarters telephoned back that, for political reasons, the works were to be spared. And they were spared; and except some damage that was done to two gas-mains where the delayed action of a mine blew up one of the Lille gates—the damage being repaired in a couple of days—no damage was done to the works or mains at Lille. The Electric Company who owned one of the most up-to-date and finely equipped electric stations in France just outside Lille were less fortunate. The Germans began to strip the electric station as long ago as January, 1918; and they completely swept it out before they left, and dynamited whatever they could not take away. In this case, the French Government have come to the help of the Electric Company; and we hope very shortly the Company will be in the position themselves to supply current to Lille, having at the present moment to get it from elsewhere. I need not dwell upon what has occurred at Nancy, because you will have seen, over and over again in the newspapers, references to the bombardment of the town by aeroplanes and long-range guns, and great damage has been done to the place. Colonel Le Roy-Lewis says that round the railway station considerable damage has been done; but you will be glad to hear that the gas-works—we own the whole capital except one share—have entirely escaped injury, and the gasholders—most ornamental and fine holders they are too—were also uninjured during the war. There is the little town of Flushing, about which I have no more to say than this—that, having been a source of great loss to us during the early years of the war, the authorities took a more broad-minded view than their Belgian neighbours, and allowed us to increase the price of gas several times since the outbreak of war; and therefore, instead of being a charge upon our revenue during the past year, we have made a small profit.

AT HOME.

As to our assets at home. You will remember that last year I told you we had securities amounting to £830,000, and that our freehold premises in Austin Friars were worth £70,000 making a total of £900,000. A re-valuation of our stocks and shares has led to the discovery that we are even £12,000 richer than we thought, which is some satisfaction at all events. During the year, we took advantage of what we thought to be the high price of Consols, and sold them at 60—reinvesting the proceeds in 5 p.ct. War Loan. This brings us in an increased yield per annum of £1316, after the deduction of income-tax at 6s. in the pound. We were also original subscribers for £100,000 of 4 p.ct. (free of tax) War Loan. As this was of no advantage to the Association, as the Inland Revenue Commissioners do not take it into consideration as having paid income-tax, we disposed of this £100,000 of 4 p.ct. Loan, and bought altogether £100,000 of National War Bonds, which we secured at a small discount. Besides this, during the year, we took up another £8000 of National War Bonds with money we do not require at the moment. I have now gone through an enumeration of our position both abroad and at home; and though I have not any motion to submit to you, I shall be pleased to answer any question within my power. [Applause.]

A PROPRIETOR asked whether the Association were interested in the electric works at Lille.

The CHAIRMAN said the Association were interested in this way: They owned a little over half the shares of the Société Lilloise and were also large holders of obligations or debentures in the Company.

Sir PERCEVAL LAURENCE spoke at some length of his experiences in presiding over a Commission which was appointed to investigate and to make assessments on claims for compensation for damages for war loss during the South African war; and he offered, if he could be of any service, to place his experience at the disposal of the Board.

The CHAIRMAN, in some comments upon Sir Perceval's remarks, said the Belgians had passed a law which in effect meant that they would not help foreigners in their country. The Association were therefore at the mercy of the English Government. They could not do anything in Belgium—they could not get anything back for damage, except through the British Government. This was a point he wished to impress. Therefore any Royal decree in Belgium did not really help them in this regard.

Mr. HANFORD observed that, in liquidating companies, it was usual to make an interim distribution as early as possible. The Association owned some £900,000 in this country; and he asked the Chairman whether the Board thought of making an early distribution of the money that was in their hands.

The CHAIRMAN replied that he need hardly explain that, in the absence of accounts, it would be illegal to distribute any part of the £900,000. He would, however, promise that, as soon as there was anything of real importance to tell the proprietors, they should be either brought together again, or a statement should be published in the Press. As soon as accounts could be published, and they had the money, the proprietors should have whatever there was to distribute.

A very hearty vote of thanks was passed to the Chairman and Directors, on the proposal of Sir JAMES MURRAY.

GAS-WORKS EXTENSIONS AT MANCHESTER.

The question of extensions at the Bradford Road Gas-Works of the Manchester Corporation came up for discussion at a meeting of the Manchester City Council last Wednesday.

The LORD MAYOR (Alderman W. Kay) in moving the adoption of the Gas Committee's minutes—containing a recommendation in favour of accepting the tender of West's Gas Improvement Company for the construction and extension of two retort-houses and the installation of vertical retorts, with coal and coke handling plants, at the Bradford Road works—said the Manchester gas undertaking had a lower debt per 1000 c.ft. than, with one exception, any other gas undertaking in the United Kingdom. Manchester's debt on the gas-works was 3s. 3d. per 1000 c.ft. capacity, which was the same as at Widnes. The Bradford Road works, when the alterations referred to had been completed, would be capable of turning out 2,000,000 c.ft. of gas per day; and they would then have reached the limit of their capacity. The cost of the scheme would be somewhere in the neighbourhood of £200,000. In conclusion, Alderman Kay referred to the cheap rate at which Manchester was able to sell its gas.

After some discussion, the minutes were approved.

BIRMINGHAM CORPORATION GAS SUPPLY.

Resignation of the Chairman of the Gas Committee.

Alderman Sir Hallewell Rogers, M.P., for the past fifteen years Chairman of the Birmingham Gas Committee, has resigned his position on the City Council (and therefore on the Committee).

In a letter to the Lord Mayor (Sir David Brooks), which was read last Tuesday to the members of the Council, Sir Hallewell said that when he was elected to Parliament he hoped to continue his municipal work. But he had found the strain, coupled with his business engagements, had been too much for him; and he was ordered by his medical adviser to relinquish some of his work, and also to take an immediate rest.

The Lord Mayor expressed regret that Sir Hallewell had found it necessary to leave the Council, of which he had been a member since 1893. He was made an Alderman in 1902; and he served the office of Lord Mayor in 1902 and 1903. In the latter year, when King Edward opened the Welsh Water-Works, he received the honour of knighthood. Sir Hallewell's work had, since he gave up the office of Lord Mayor, been in connection with the Gas Committee—a large and important department of the Corporation, having an immense turnover and requiring the services as Chairman of a man of striking business capacity. Sir Hallewell had filled the qualification in an eminent manner; and the Council warmly appreciated the valuable services he had rendered to the city for twenty-six years.

Increase in Price at Stretford.—The Stretford Urban District Council report the receipt of a notice from the Stretford Gas Company stating that, owing to the increased cost of materials for the upkeep of works, and the probable increase in the price of coal, they were reluctantly compelled to raise the price of gas 8d. per 1000 c.ft. to all consumers from and after the date of the reading of the meters for the March quarter. The Clerk stated that, with the increase, the price charged by the Company would be 4s. 6d. per 1000 c.ft.

THE CONDITION OF THE TEIGNMOUTH GAS-WORKS.

Mr. W. Doig Gibb, O.B.E., M.Inst.C.E., in his report on the Teignmouth Gas-Works, states that the bad condition of the works generally is not due to any want of care and attention on the part of the Gas Committee of the Teignmouth Urban Council or of managers past and present. Bad luck, and not bad management, had caused the Council to run a nearly obsolete plant through all the war years. Mr. Gibb agrees with the recommendations of the present Manager (Mr. H. Higham) that the works must be reconstructed. He thinks the Manager's estimate of the cost should be £17,750, and not £17,250; and to this must be added 10 p.ct. for increase in cost since January last. He considers the Council would be justified in estimating the cost of the new works at £21,300. The estimated saving by the new works would be about £3000 per annum. The Council must in any case, adds Mr. Gibb, carry out the Manager's proposals for a new boiler (setting and mounting), exhauster and condensers, extraordinary repairs, painting, &c. The Council must either spend about £6000 in renovating the existing retort-house, and in consequence continue their present high working cost, or else carry out the new work indicated. There was grave necessity for moving immediately; and the latter proposition was the only possible one. The present Manager he considers is quite competent to carry out the proposed extension without any outside help.

As an immediate necessity the Council have decided to spend £500 on repairs.

GAS-WORKS EXTENSIONS AT WARRINGTON.

Proposed Expenditure of £140,000.

At their meeting last Tuesday the Warrington Town Council decided to make application to the Local Government Board for sanction to borrow a sum of (approximately) £40,000, for the installation of water-gas plant and for improvements at the Longford Gas-Works. The Local Government Board are to be asked to expedite their sanction, in order that the plant may be available for use next winter. The Gas Committee are also considering a scheme for the remodelling of the works. This is expected to involve a further expenditure of about £100,000. Meanwhile, the water-gas plant is to be installed as a stand-by, to save the town from a repetition of the shortage of gas last year.

Alderman Bennett said they were now realizing how inadequate and out-of-date was the gas-plant at the works. It was no use crying over spilt milk; but he feared that in their anxiety to keep-down the rates in years past they had starved the gas undertaking. It was false policy; and it would have been wiser if they had kept the rates higher and made their plant up-to-date.

It was explained that in 1914 the Gas Committee had prepared a scheme for improving the gas-works; but owing to the war sanction to loans could not be obtained from the Local Government Board.

BELFAST ELECTRICITY SCHEME.

A remarkable *crux* has arisen in relation to the cost of the new electricity station which the Belfast Corporation propose to erect on a site close to the harbour. The original estimate of Sir John Snell, the Consulting Engineer, for foundation and buildings was £46,000; but it was recently stated that the superstructure would cost at least 50 p.ct. more than the foundations, and that the combined expenditure would be from £250,000 to £300,000. Another estimate for buildings, prepared by Mr. Cutler, and based partly on tenders received, amounted to £210,000. Sir J. Snell, when the first tenders for plant were considered, had indicated a possible expenditure of £420,147, which would include switch gear and transforming plants at the shipyards. He did not bind himself to this figure in view of rising prices. Mr. Cutler's estimate would raise this total to £582,147. In a further detailed statement prepared by Messrs. Cutler, Bloxam, and Geale, the total is given at £648,590, and is principally based on tenders received or accepted, upon the actual cost of work done departmentally, and, to a small extent, upon estimates. The great excess over the original estimate is in the cost of buildings and foundations £162,600.

Messrs. Preece, Cardew, Snell, and Rider have now submitted some amended figures, showing the estimated results of the working of the scheme. In the estimates of April last year, Sir J. Snell placed the net surplus revenue at £15,648; in an estimate in September last, he placed it at £93,224; Messrs. Preece, Cardew, Snell, and Rider then submitted an estimate at £7400; and the amended figures give a net surplus revenue of £2184, after allowing for £50,287 of new capital charges. It is not considered probable that the whole of these charges will become due in the current year. The firm estimate the revenue of the power-house at £205,087. This is based on a sale of 34,186,000 units; the coal price being taken at 29s. 6d. per ton.

At a recent meeting of the Corporation, Mr. F. Curley, J.P., mentioned that, in committee, Mr. Rider had stated that his firm had made a mistake in the advice they had tendered, and that some other advice which they should have given had been held back. Mr. J. Warwick wished to know why there were four or five different prices for electricity, and why one manufacturer obtained current at a cheaper price than another, adding that he did not think this occurred in connection with the gas undertaking. Mr. Riddell replied that electricity could not be stored in the same way as gas without the use of not very economical methods.

On the motion of Sir James Johnston, who observed that subsequent demands had compelled them to increase the provision, a resolution was passed in favour of an application to the Local Government Board for sanction to a loan of £630,000 for an equated period of thirty years, in substitution for the sanction applied for to a loan of £310,750.

A motion that Counsel's opinion be taken with a view to terminating the Corporation's agreement with Sir John Snell was defeated by 13 votes to 8. Alderman Tyrell argued that all the reports and estimates of Sir John Snell were unreliable, and that the remedies he proposed for getting rid of the difficulties that had arisen were no more reliable than the estimates. In the Alderman's opinion, the whole question of electricity supply, like the administration of the electricity station, had been a colossal blunder on the part of the Corporation. Mr. Alexander endorsed the view that Sir John Snell was responsible for the serious financial position, and complained that Sir John had not come there to face the music, but had merely sent his junior partner.

Sir J. Johnston explained that Sir John Snell was engaged on important work in the Board of Trade, and was unable to give personal attention to this work. His partner, Mr. Rider, had been consulted again and again, and he (Sir James) believed they would get good advice from him. Mr. Rider addressed the Council, stating that he had had nothing to do with the original figures, but that his responsibility was none the less. The cost of everything had gone up since the original estimates were made; and he advised that they should proceed with the work, otherwise their position would be infinitely worse.

It was agreed that no further contracts should be entered into until the Local Government Board had sanctioned the loan.

SHEFFIELD GAS CONSUMERS' ASSOCIATION.

The Percentage of Inerts.

In their first annual report, the Sheffield Gas Consumers' Association state that the tests carried out on behalf of the Association have "shown an extraordinarily higher percentage of readings below the standard than those obtained by the official gas examiner." Apart from the low calorific value, the frequent occurrence, week by week, of a large percentage of the pressure readings being below the legal minimum, is clearly brought out in the reports, and is certainly an even greater cause of annoyance and loss to the consumers than the low calorific value. Gas analysis, month by month, of large numbers of samples, emphasizes the regular and continuous improper quality of Sheffield gas. Whereas in pre-war days the "inert constituents" were generally about 5 to 5½ p.ct., they have throughout the year averaged 29·7 p.ct., frequently exceeded 40 p.ct., and have reached a maximum of 51·8 p.ct.

Representations were made to the Corporation and to the Nominee Gas Directors; and some good has resulted. The question of the gas supply has now been handed over to the Development Committee of the Corporation; and it is hoped this Committee will be able to give the question the attention it deserves. The Town Clerk has been requested to report on the legal position and obligations of the Company. The Consumers' Committee have been reluctant to take legal advice as to the position of consumers, recognizing the difficulties of the Gas Company; but it is felt that these difficulties might, and ought to, have been overcome.

Correspondence has also taken place with the Gas Company, who have complained bitterly of the trouble they have had in securing and retaining an adequate supply of labour; but during the period in question other large firms multiplied their number of employees two-fold and more, and it was thought the Gas Company might have done something similar. The Committee of the Association express the opinion that many other individual users of gas in Sheffield and district would benefit by joining the Association; and this would enable the Committee to extend their activities.

Morley Gas-Works Deficit.—The Morley Town Council have approved a recommendation by the Gas Committee that the question of applying for power to increase the price of gas should be considered. In submitting the annual estimates of expenditure chargeable to the general district fund, Alderman B. B. Barker said it was proposed to provide £1250 this year towards an accumulated deficit on the gas-works revenue account of £6784. The estimates were approved.

Belfast Gas Undertaking.—The amount of gas sent out from the Belfast Corporation Gas-Works in the year ended March 31 was 2664 million c.ft., being about 4¾ p.ct. less than in the previous twelve months. This decrease is attributed to the lighting restrictions owing to war conditions, and to the industrial strike in the city in January and February last, when the amount of gas consumed was only nominal. Of the total amount, some 1855 million c.ft., or 65·64 p.ct., was coal gas, and 809 million c.ft., or 30·36 p.ct., water gas. The proportion of water gas was higher than last year.

Trim Gas-Works.—Mr. H. J. Dumbleton, gas expert, of Dublin, writing to the Trim (co. Meath) Urban Council, referred to the report of the Council's Engineer recommending expenditure on repairs of the gas-works buildings, and said his own recommendation for expenditure on the retort-setting he considered essential in order to ensure continuity of supply in the winter of 1919. He suggested that the Engineer should submit a scheme of patch-work repairs in other respects, to carry over for 12 months, at a cost as low as possible. He recalled that the estimated expenditure for the year is £800, and the receipts £670—already showing a loss of £130—and pointed out that if an estimated expenditure of £320 were incurred, the gross loss would be £450. It was unthinkable that an addition of 4s. 6d. in the pound could be made to the rates. It would be a great pity, he added, if, after struggling through practically five years of adversity, and when the working results were showing signs of healthy improvement, the ratepayers should now be denied the utility of a gas supply. The Chairman (Mr. F. C. O'Reilly) said the Council did not consider they would be justified in expending any large amount on the works, in view of the probable introduction of electric lighting. Ultimately, it was decided to allocate £50 for immediate repairs.

THE BREAKING-UP OF ROADS.

The Institute of Municipal and County Engineers asked their Roads and Tramways Committee to consider matters in respect of desirable alterations in the law as affecting public highways.

The Committee report that they are of opinion that, in view of the importance of good roads to the well-being of the nation, it is desirable that the general law governing these matters should, as soon as possible, be codified and so amended as to afford greater protection of the paramount interests of the public user of the highways for traffic. In regard to the powers and conditions under which highways may be interfered with by statutory companies and others for the purpose of laying mains, cable, drains, &c., and in regard to subsequent reinstatement, it is suggested that the Gas and Water Works Clauses Acts, 1847, should, so far as they relate to interference with the highway, be superseded; and that all statutory undertakings should be brought within a new Act, which should provide *inter alia:* (*a*) That in any case of breaking-up, excavation, or interference with any highway for any purpose whatever, whether authorized by Statute or otherwise, the Highway Authority for the time being having charge or control of the road shall have the option of themselves executing all, or any part, of the work in connection with the breaking-up, filling-in, and re-instating at the cost of the persons, body, or undertaking, requiring to carry out such breaking-up, excavation, or interference (*vide* Electric Lighting Clauses Act, 1899, section 114; Metropolis Management Act, 1855; and section 82 Metropolis Management Amendment Act, 1862). (*b*) That if the Highway Authority decline to move, such breaking-up, excavation, or interference, with any highway shall be carried out in accordance with such reasonable directions and requirements of the Highway Authority in the interests of the users of the roads as may from time to time be prescribed by such authority, including the maintenance of the surface disturbed, for twelve months after the final reinstatement. (*c*) That in the re-instating or making good of any breaking-up, excavation, or interference with the highway, the liability of the person, authority, or undertaking shall include all such work as may be necessary to completely restore the highway to the condition of stability and surface it was in before such breaking-up, excavation, or interference took place.

In connection with their housing scheme, the Leeds Corporation have approved of a proposal to instal gas-radiators in one cottage and electricity in another, for experimental purposes.

The annual meeting of the Labour Co-Partnership Association will be held on Thursday, the 22nd inst., in the Hoare Memorial Hall of the Church House, Great Smith Street, S.W. The chair will be taken at 3 o'clock by Lord Robert Cecil, M.P.; and the Right Hon. J. R. Clynes, M.P., will deliver the address.

EXAMINATIONS IN GAS SUPPLY.

The following are the questions set by Mr. Walter Hole, of Leeds, for examinations in "Gas Supply," held last Saturday, under the auspices of the City and Guilds of London Institute.

Grade I.

1. How would you deal with a 4-in. gas-main which owing to the subsidence of the subsoil due to undermining was continually being fractured and developing leaks? (32 marks.)

2. What is the percentage composition of (*a*) soft solder, (*b*) brass, and (*c*) gun metal? How would you proceed to make a mitre joint on a piece of $\frac{3}{8}$ in. brass tube? (32.)

3. How would you test a 100-lt. dry meter *in situ?* (36.)

4. To what points would you give special attention in order to obtain the greatest efficiency and economy in the running of a gas-engine? (38.)

5. To what extent does the power of a light diminish in proportion to the distance from its source? If a burner were giving a light equal to 100 candles at 2 ft. distance, what candle power would you expect to find along the same line at 40 ft. distance? (38.)

6. In fixing a radiant gas-fire before a fireplace in the flue from which there is a down-draught, what steps would you take to ensure the satisfactory working of the fire? Illustrate your answer by a sketch. (34.)

7. What are the causes of unaccounted-for gas, and what practical steps would you take to minimize the loss in each case? If a gas undertaking having 55 miles of mains and 11,420 consumers makes 167 millions of cubic feet per year, sells 152½ millions, and uses 1½ millions on the works, what is the unaccounted-for gas (*a*) in percentage of make, (*b*) per mile of main, (*c*) per consumer? (42.)

8. What are the constructional points in a gas-cooker which ensure the greatest thermal efficiency? (34.)

9. On what general principles would you determine the position, character, and distribution of light in (*a*) a dining room, (*b*) a class room, and (*c*) a sick ward in a hospital? (42.)

10. What are the chief points in the construction of a gas-heated furnace, and what precautions would you observe in fixing one to ensure satisfactory working? (38.)

Final.

1. Describe fully, step by step, how you would proceed to lay three lengths of 24-in. main, the joints on which must be made before lowering the pipes into the trench, and state what tools you would require for the work. (36 marks.)

2. If there were a stoppage on a main supplying a district, how would you proceed to locate the obstruction? How would you clear the main in the event of the stoppage being due to (*a*) deposits of naphthalene, (*b*) collection of condensation, (*c*) corrosion? (32.)

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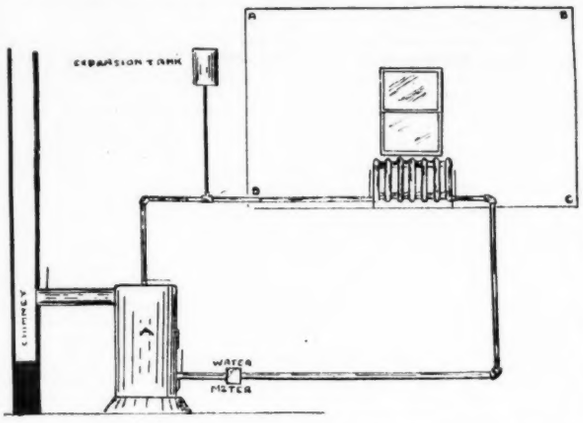
3. How may the highest degree of efficiency be secured in (*a*) the oven, and (*b*) the top burners, in an ordinary gas cooker? What tests would you apply to ascertain their thermal efficiency? (32.)

4. What general principles should govern the lighting of a class-room at school? If it were required to light the desks with a minimum intensity of 2 foot-candles, what must be the candle power of the source of light along the line from burner to desk where the maximum distance is 10 feet? (32.)

5. The accompanying sketch shows a simple installation of gas-



heated boiler and radiator. How would you proceed to test this for thermal efficiency? (42.)

6. Sketch the lower hemispherical curve of (*a*) an upright incandescent burner, and (*b*) an inverted incandescent burner, each working at a pressure of 2½ in. and each consuming 3½ c. ft. of gas per hour. (38.)

7. A room 16 ft. by 12 ft. by 10 ft. is lighted by two inverted incandescent burners, each consuming 4 c.ft. of gas per hour. What quantity of air per hour will be required for combustion, and what will be the proportion by volume of the products of combustion? If the air of the room be entirely changed three times every hour, what proportion will the air required for combustion bear to the whole quantity passing through the room per hour? (38.)

8. State the general character of good public lighting. Describe how you would test the lighting efficiency of a public lamp. (34.)

9. Draw an approximate indicator diagram taken on a 10 H.P. gas-engine in good working order, and show by a further diagram how the first would be affected by (*a*) pre-ignition, (*b*) late ignition, and (*c*) faulty rings in the same engine. (42.)

10. In what respects would the whole subject of gas supply be affected—particularly in regard to mains, services, and apparatus for burning gas—should the proposal for distributing gas of about 350 B.Th.U. net be adopted? (34.)

EXAMINATIONS IN GAS-FITTING.

The following are the questions set by Mr. Ralph Halkett for candidates in the recent examinations in "Gas-Fitting," under the auspices of the City and Guilds of London Institute. The number of marks accorded are indicated in parentheses.

GRADE I.

[Not more than six questions to be attempted.]

1.—State how you would test an installation of piping for soundness. Which do you prefer, iron or compo pipe, for the gas-fitting of a house? Give your reasons. (45.)

2.—Describe upright and incandescent burner. Name each part. Is the efficiency increased by the use of a chimney, and if so, why? (40.)

3.—Why is the adjustable flat-flame burner preferable to the single jet or slit burner? What is the governing factor when deciding the size of burner to adopt? (40.)

4.—Give a sketch of a good bunsen burner for lighting purposes. Name each part. (50.)

5.—Give a sketch of an 8-in. water-pressure gauge, and show a pressure equal to 3 in. of water column upon it. How many inches in water column are equal to 1 in. of mercury? (55.)

6.—What tools would be required, and for what purpose would they be used by a gas-fitter, in carcasing a house having ten lighting points, four fire points, and one cooker point? (45.)

7.—What precautions are necessary when fixing a meter? Give the consumption registered as shown on index of gas meter, the previous reading being 25,500. (55.)

8.—Describe a gas-steam radiator. Name each part. What size of gas supply pipe would be fitted to a 36-in. eight-loop radiator? (55.)

GRADE II.

[Not more than six questions to be attempted.]

1.—Is it necessary to fix a flue-pipe to a gas-cooker? If so, why? What good purpose is served by fixing a hood to a gas-cooker? How is it fixed, and where would you carry the flue outlet to? (40.)

2.—Sketch a section through any inverted incandescent burner with which you are familiar, and describe the utility of the separate parts. What is the effect of (*a*) an excess of air and (*b*) an insufficiency of air

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in an inverted incandescent burner, and state precisely how you would proceed to correctly adjust the gas and air supply. (55.)

3.—Give a list of the various gas-burners in general use; their hourly consumption and illuminating power. (40.)

4.—What size of pipe would you recommend to be run to a gas-fire consuming 35 c.ft. of gas per hour, with a 25 ft. run of pipe? Show how you arrive at your statement. Would you recommend an inset frame fire or a fuel burner with asbestos fuel, to be fixed in an ordinary dining-room grate? Give your reasons for your choice. (45.)

5.—Describe an open type and a sealed type geyser. Which type gives the quickest hot waer, and which would you recommend for general purposes? (60.)

6.—A house with four bedrooms, bathroom, dining-room, and drawing-room, and sitting-room, kitchen, and usual offices, is to be fitted with gas-pipes. The meter is to be located in the scullery at the back portion of the house. Provision is to be made for gas-fires and lighting points in each room, gas circulator in kitchen, and cooker supply in scullery. Give the size of rising main, the size and position of pipes you would run to the different supplies, the total hourly consumption, and the size of the meter you would fix. (55.)

7.—Under what circumstances would you consider it necessary to work with live gas? State the precautions you would take to avoid gassing. How would you deal with a person who was gassed? (45.)

8.—Give a sketch of a portable pressure gauge upon which 15 lbs. pressure per square inch can be registered, showing it connected to an installation ready for testing. Describe how you would test for soundness, and, assuming there was a leakage, what means would you adopt to locate it? (50.)

Final.

Written Examination.

[Not more than six questions to be attempted.]

1.—Suppose you have a shop window 12 ft. long by 6 ft. wide and 10 ft. high, to light from the interior. The light is to be out of the line of sight. State how you would comply with these conditions, the burners you would use, the total candle power, size of gas supply, and the means you would adopt for the ventilation of the heat and products of combustion. (55.)

2.—Sketch a hot-water installation showing a gas-circulator fitted to give two hot baths of 25 gallons each in succession, and the necessary hot water required for household purposes. State the size of the cylinder, pipes (hot and cold), circulator, and size of cold-water feed cistern required, and also the necessary precautions to be observed in order to obtain the highest efficiency. (55.)

3.—Describe (*a*) a natural draught oven furnace, (*b*) an air blast furnace. What class of work would you recommend the use of these furnaces for, and give the temperature you would obtain, and the air pressure you would recommend for the satisfactory working of the blast-furnace. (45.)

4.—Give a sketch of a set of compressors in duplicate for high-pressure gas, to deliver 4000 c.ft. of gas per hour, fitted with the necessary pipes, &c. Describe the means whereby the pilot lights to fittings are maintained when the compressors are not working. (55.)

5.—Suppose you are asked to supply gas appliances to do the cooking, and to heat water both for the making of food and the general kitchen purposes, for 300 persons. Name the appliances you would recommend, together with their hourly consumption, the size of gas service, and the meters you would instal to give the necessary gas required. (50.)

6.—State the cause, and how you would remedy, the following defects of a gas-engine: ((*a*) Difficulty in starting; (*b*) unaccountable stopping; (*c*) irregular running; (*d*) loss of power. (45.)

7.—Can a consumer compel a gas undertaking to give a supply of gas? If so, why can he compel it, and under what conditions? (40.)

8.—State the common troubles met with when maintaining the following burners: (*a*) "C" burner; (*b*) inverted burner; (*c*) burner in high-power low-pressure lamps; (*d*) high-pressure lamps for public lighting. What, in your opinion, is the number of mantles required per annum for each class of burner to maintain efficiency? (45.)

Practical Tests.—Grade II.

[Candidates must attempt all questions.]

1.—Make knee joint on 1¼-in. lead pipe and solder on 1¼-in. cap and lining, as per sketch—1 hour allowed. (50.)

2.—Screw ¾-in. iron barrel (pipe) and construct a 2 ft. 6 in. square frame. Leave all joints gas tight—1½ hours allowed. (60.)

3.—Explain the working and reading of a pressure-gauge. Detail the method you would use in locating an escape on an installation (*a*) when charged with air; (*b*) when charged with gas—¼ hour allowed. (25.)

4.—Inspect gas-cooker. Point out to examiner the probable defects that may arise when in use, and how you would remedy them—¼ hour allowed. (25.)

5.—Examine geyser and explain the construction of same, also what precautions are necessary when fixing it to ensure satisfactory working—¼ hour allowed. (25.)

Practical Tests.—Final.

[Candidates must attempt all questions.]

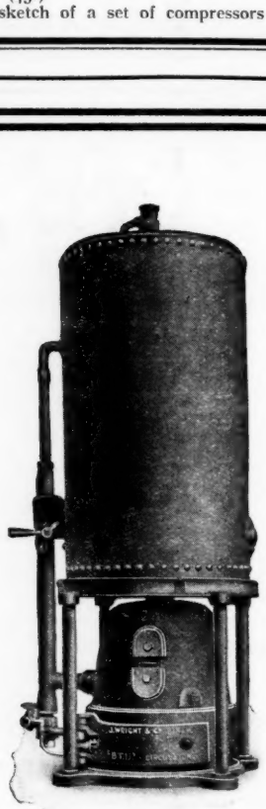
1.—Make saddle bend on 1¼-in. lead pipe as per sketch, and solder 1¼-in. cap and lining on one end—1 hour allowed. (50.)

2.—Fix temporary gas supply to gas-fire, including control cock and brass tube—1 hour allowed. (50.)

3.—Make Tee pendant with ½-in. iron barrel (pipe) stem, and ¼-in. iron barrel (pipe) arms fitted with ¼-in. iron ell cocks and ½-in. cup-and-ball joint—¾ hour allowed. (50.)

4.—Describe a gas-steam radiator, and detail the working of the automatic valve—¼ hour allowed. (20.)

5.—Examine pneumatic valve with bye-pass, also switch, and explain their working. Detail how it is fixed to a 2-lt. pendant, and the parts that require periodical attention—¼ hour allowed. (20.)



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COKE AND BYE-PRODUCTS EXAMINATIONS.

The following were the question papers set by Mr. D. V. Hollingworth, F.I.C., F.C.S., at last Wednesday week's "Coke and Bye-Products Manufacture" examinations of the City and Guilds of London Institute. In each case not more than eight questions were to be answered.

Grade 1.

1. Draw a sectional elevation (approximately to scale) of the apparatus employed for conveying gas from the ovens to the condensers. Describe how the apparatus is kept clean; and mention the disadvantages which follow neglect of this precaution. (35 marks.)
2. Describe, and give a sketch of, any modern appliance for the combustion of spare coke-oven gas under boilers. (30.)
3. What are the conditions essential for the maximum extraction of benzol and its homologues from coke and oven gas? Give the properties of a suitable scrubbing oil, and state the quantity to be put into circulation in comparison with that of the crude 65 p.ct. benzol produced. (35.)
4. State exactly the procedure adopted in the preparation of coal for coking—beginning with the coal as raised from the mine and ending with its delivery at the ovens. Draw a sketch of any form of coal-crusher in common use. (40.)
5. Describe fully the construction, working, and methods of controlling any form of gas-exhauster. Illustrate your answer with sketches of the exhauster and its inlet and outlet connections. (30.)
6. Describe, with the aid of sketches showing sectional elevations, the heating arrangement of any form of regenerative coke-oven. (45.)
7. State the capacity and approximate dimensions of the plant required for the distillation of 120 tons of coke-oven tar per week; and state the quantity of the principal products you would expect to obtain. Show by a simple plan how the plant should be laid out. (45.)
8. Describe briefly a machine for quenching and loading coke. What advantages are obtained by its use as compared with performing these operations by hand? (35.)
9. Draw a sectional elevation of any type of plant in use for debenzolizing rich wash-oil, and describe its working. State the temperature usually observed at the outlet of each piece of apparatus described. (45.)
10. Compare the physical and chemical properties of coke suitable for the blast-furnace with those of foundry-coke. State exactly how you would ascertain (*a*) the coking index of coal, and (*b*) the hardness of coke. (40.)

Final Grade.

1. Describe, in detail, the operation of starting-up a new battery of coke-ovens. Mention the precautions which should be taken during erection, and preliminary heating, to prevent damage. (35 marks.)
2. What modifications in the arrangement of coking-plant and methods are necessary to enable coke-oven gas to be used for public lighting and heating? Compare the composition and calorific value of such gas with producer gas. (40.)
3. Describe, with sketches of the plant employed, the manufacture from 65 p.ct. crude benzol of a spirit suitable (under all conditions) for use in internal combustion engines. Give the composition, calorific value, and usual distillation test result of such a spirit. (45.)
4. Draw-up a statement of the total cost of manufacturing sulphate of ammonia, and state exactly how you would arrive at the value of crude ammoniacal liquor containing 1·25 p.ct. of ammonia. (40.)
5. Compare—by reference to two sketches, showing longitudinal sectional elevations—the heating arrangements of any type of coke-oven having horizontal flues with those of one having vertical flues. (45.)
6. Give an outline of the most recent theories relating to the destructive distillation of coal. Discuss the principal factors which influence the quantity and nature of the products obtained. (35.)
7. Describe fully any process for the recovery of cyanides from coal gas. (35.)
8. Give a full description of the method and apparatus employed for ascertaining the quantity of sulphur in any two of the following products: (*a*) Motor benzol, (*b*) metallurgical coke, (*c*) chimney gases, (*d*) return-oven gas, (*e*) concentrated ammoniacal liquor. (35.)
9. Draw a diagram showing the whole of the apparatus usually installed between the inlet to the condensers and the outlet of the final scrubber at works where sulphate of ammonia is made by a direct process. State the usual thermometer and manometer readings at the inlets of all the apparatus included. (40.)
10. Give the percentage composition of crude 65 p.ct. benzol. Mention the principal impurities present, and how they are eliminated. Describe (with sketches of plant employed) any process for the purification of a valuable substance present in the crude-still residues. (40.)

Gas-Workers' Hours and Pay at Sheffield.—Last week at a mass meeting of the whole of the Sheffield gas-workers, Mr. C. H. Blackburn, the District Secretary, who presided, gave a report on the national settlement. He stated that he, along with a deputation, had met the Sheffield Gas Company; and it had been agreed that the whole of the terms should be put into operation—viz.: (1) That yardmen and all classes now working the 53-hour week shall be placed on a 47-hour week, without any reduction in weekly pay, as from May 1, 1919. (2) Shift workers to continue as at present on the eight-hour shift; but their rate to be increased 6d. per day or shift as from May 1. (3) In cases where gas undertakings are still on the twelve-hour shifts, these will be reduced to the eight hours as soon as possible, and within six weeks from May 1. (4) Where gas undertakings are reducing the hours from twelve to eight per shift, the increase of 6d. per shift is not payable. As this is a national agreement, certain details were left over for local arrangements as to the working of the 47-hour week, &c. The deputation who had met the Company had arrived at a satisfactory settlement affecting the whole of the men.

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The only inexpensive Closed-Type Machine with
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¶ All Copper body, White Enamelled Cast-iron base, double handed, and with or without Interlocking Taps.

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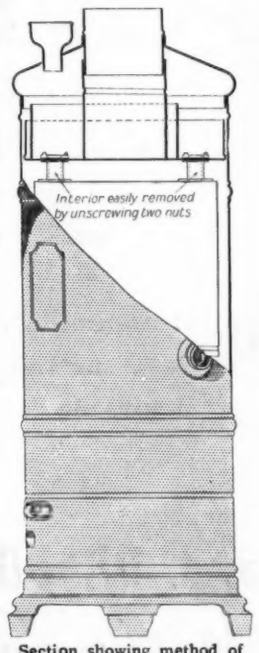


Section showing method of Detaching Interior.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 12.

The London tar products market position is unchanged. Pitch remains firm at the last quotations. Makers are still shipping, and next season's outlook is good. Tar spirits keep quiet, with the exception of benzol, which is being freely supplied as a motor fuel. Creosote continues at from 6d. to 6¼d. net per gallon *ex* producer's works.

Sulphate of ammonia, still under official control, is without alteration.

Tar Products in the Provinces.

May 12.

The average values for gas-works products during the week were Gas-works coal tar, 35s. to 40s. [The price of tar (34s. 6d. to 39s. 6d.—the same as the previous week's quotations) was, by inadvertence, omitted from our last report.] Pitch, East Coast, 55s. to 57s. 6d. per ton f.a.s.; West Coast—Manchester 45s. to 46s.; Liverpool, 46s. to 46s. 6d., Clyde, 52s. 6d. to 55s. nominal. Benzol 90 p.ct., North, 1s. 9d. to 1s. 11d.; crude, 65 p.ct., at 120, 1s. 1d. to 1s. 2d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 9d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 10d. to 2s. 1d. Heavy naphtha, North, 2s. 6d. to 2s. 7d. Creosote, in bulk, North, salty, 4½d. to 5d.; ordinary liquid, 5d. to 5½d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., nominally 1s. Naphthalene, £16 to £20; salt, £5 to £6, bags included. Anthracene "A" quality, 7d. to 7½d. per minimum 40 p.ct.; "B" quality, 2d. nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Reports from France indicate that the market there has been somewhat under the influence of recent political events. The attitude of Labour is uncertain; and although financial circles are more optimistic, trade is suffering from the high rate of exchange with foreign countries, especially with Great Britain. Transport by rail is improving only very slowly, and Government-owned stocks of coal-tar products are still very extensive. In all these circumstances, it is not surprising that business has been inactive. At home here satisfaction is expressed that some effort has been made in the Terms of Peace to restrict German activities in the coal-tar products and dye industries; provision being made for delivery by Germany to France, over three years, of benzol, coal tar, and sulphate of ammonia. Market conditions have not changed very much; but where movements have occurred, they have favoured sellers. Production, however, particularly in northern districts, is restricted, and will continue so till the end of June at any rate, when the position of the coke-oven industry will, it is hoped, become more clear. The market in pitch is an improving one; there being plenty of inquiries at gradually improving rates. Altogether the prospects are regarded as decidedly favourable. Prepared tar is in excellent demand, and some makers are sold as far forward as September. Carbolic acid is as flat as ever, although holders of crystals are making a brave attempt to keep prices at 5d.—so far without attracting business. Creosote and heavy oil are exceedingly firm. Solvent naphtha still seems in plentiful supply, and no improvement in conditions and prices is likely until Government stocks of rubber and mackintosh material are reduced. Heavy naphtha is without change. Benzol continues an excellent market, and most makers can now find ready local demand for it. Considerable quantities are being sent to Ireland from the northern districts. The advantages of benzol as a motor fuel are being appreciated. Both in specific gravity and calorific value benzol holds the advantage over petrol; for though motorists buy their spirit by the gallon, the engine uses it by the pound. Benzol is 1½ lbs. per gallon heavier than petrol, and therefore it is possible for a car, capable of carrying ten gallons of spirit, to carry 88 lbs. of benzol as compared with 72½ lbs. of petrol. It is estimated that the coke-ovens of this country could produce 23 million gallons of purified benzol a year, gas-works 15 million gallons, and tar-works 4 million gallons. Other products are without change.

The range of home quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 9½d. North; crude 60-65% 1s. 6½d. to 1s. 7½d.; pure, 2s. 6d. per gallon naked.

Carbolic Acid: Crude 60's unsaleable; crystals 40%, 5d. per lb. asked.

Crude Tar: London, 42s. to 44s.; Midlands, 38s. to 40s.; North 38s. per ton *ex* works.

Pitch: London, 67s. 6d. to 70s. per ton; East Coast, 53s. to 55s. per ton; West Coast, 46s. to 48s., with Manchester 47s. per ton and Glasgow 47s. 6d. per ton; South Wales, 56s. to 58s. per ton.

Solvent Naphtha: London, 2s. 1d. to 2s. 4d. Provinces average 2s. 2d. per gallon.

Crude Naphtha: Naked, 10d. per gallon.

Heavy Naphtha: 2s. 4d. per gallon.

Naphthalene: Refined, £18 to £19 per ton nominal; crude, £5 10s. to £10, according to quality.

Toluol: Naked, 2s. 1d. to 2s. 3d. per gallon nominal. North 2s.

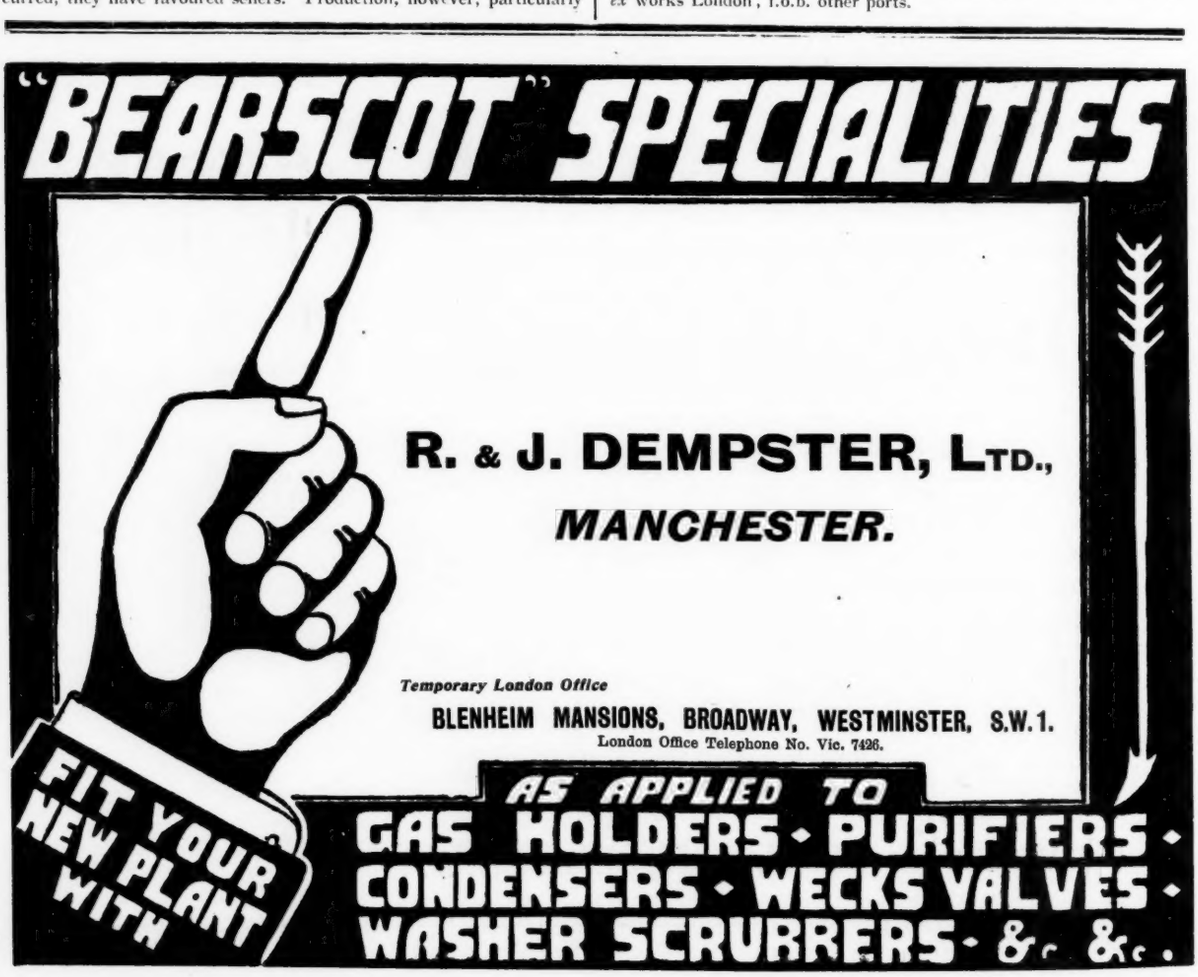
Creosote: London, 7¾d.; North, 6¾d. to 7d.; heavy oil, 7½d. per gallon in bulk.

Anthracene: 40-45%, 5d. to 8d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95%, 2s. 9d. to 2s. 10d.; 97-99%, 2s. 11d. to 3s. 3d. *ex* works London, f.o.b. other ports.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Sulphate of Ammonia.

There is nothing further to report regarding the future of the trade at the moment; but it is becoming increasingly clear that the range of export values will be a good deal less than has been generally expected. Home consumption is at present very substantial, and has gone a long way towards equalizing production. Nevertheless the prices which will be paid after June are understood to be favourable to the user. We have to remember that nitrate of soda will be decontrolled in the coming week, with the probability of a decided fall in value below the current official rate of £20 per ton. This would immediately have an adverse effect on sales of sulphate. Latest information from America shows that the domestic demand is falling off. But the export trade has picked up somewhat of late; some fairly large orders having been executed on account of European buyers. Prices, on account of slack sales at home, have eased off, and are now much below the March levels. In France, sulphate of ammonia is still under Government control. Liquid ammonia is inactive, at the equivalent of £30 per ton, including drums.

Price of Gas at Burton.—A proposal is before the Burton-on-Trent Town Council that the price of gas be increased as follows: For ordinary purposes and through prepayment meters, 7d. per 1000 c.ft.; and for motor power and other manufacturing purposes, 8d. per 1000 c.ft.—being advances of 1s. 11d., 1s. 10d., and 2s. per 1000 c.ft. respectively over the pre-war prices.

Tarred Roads and Fish Poisoning.—In connection with the communication lately contributed by Mr. W. J. A. Butterfield, M.A., F.I.C., to the "Fishing Gazette" on the subject of poisons washed into rivers from tarred roads [the main portions of which were reproduced on pp. 253-4 of the "JOURNAL"], it is interesting to note that a Joint Committee of the Road Board and the Board of Agriculture and Fisheries has been appointed to consider the effect of the tarring of road surfaces on inland fisheries, and has relegated to a Special Sub-Committee the consideration of the immediate steps which can be taken to avoid risk of injury.

Brighton Gas Company's Capital.—At a special meeting of the Brighton and Hove General Gas Company on Friday, Mr. A. M. Paddon (the Chairman), who presided, moved a resolution authorizing the raising of £99,483 of capital by the creation and issue of redeemable perference stock, and the borrowing of £32,080 by the issue of redeemable debenture stock and authorizing the formation of funds for the redemption of each kind of redeemable stock. The Chairman said that, notwithstanding the large increase of their business, the Company had raised no fresh capital since 1901. In that year the gas sold was 1084 million c.ft.; while the last accounts showed a sale of 1649 millions—an increase of 565 millions. This fact alone would be quite justification enough for seeking new capital. There was, too, every indication that the business would extend in the future as rapidly as in the past. The resolution was carried unanimously.

A Bogus Meter Inspector.—At Bradford, last week, Thos. Crosby, a hawker, was committed for trial at the next Quarter Sessions, charged with breaking into dwelling-houses and stealing. He went to houses representing himself to be a gas-meter inspector; and if nobody was in, he opened the doors with a key. He had been in custody at Burnley and Wakefield; and it was stated that there were similar charges against him in respect of offences in many parts of the country.

"Bolstering-up" an Electricity Undertaking.—On confirmation by the Rathmines (co. Dublin) Urban Council of an application for Local Government Board sanction to a loan of £10,000 for extension of mains and other purposes in connection with the electric lighting undertaking, Mr. J. A. Smyth said the ratepayers should be made aware that they were about to bolster-up an undertaking that was in an unsound financial condition. Other members questioned this statement; and Mr. Smyth said he intended to deal with the matter before the Auditor.

A List of Suppliers of Benzol.—The Commercial Motor Users' Association have issued a list of suppliers of benzol motor spirit throughout the country. The list, which has been compiled by Captain F. G. Bristow in conjunction with the National Benzol Association, is arranged in counties, and gives the name of the town, the address of the depôt, and the hours during which benzol may be obtained. A copy may be obtained free of charge on application to Captain F. G. Bristow, General Secretary, Commercial Motor Users' Association, No. 83, Pall Mall, S.W. 1.

The Fuel Control.—The Controller of Coal Mines announces that until further notice the supply and consumption of any form of anthracite coal is free from restriction under the Household Fuel and Lighting Order, 1918, and need not be recorded against the allowances of consumers. The price remains under control. Otherwise the provisions of the Order in respect of coal, coke, gas, and electricity, still apply, and will continue to do so until the coming into operation of the Order proposed for July 1, which is now under consideration, and in which certain modifications will be introduced. The position will depend on the production of the coal mines during the next few weeks.

Proposed Loan for the St. Ives Gas-Works.—An inquiry was held at St. Ives, Cornwall, on Tuesday last by Col. T. C. Ekin, a Local Government Board Inspector, with reference to an application by the Town Council for leave to borrow £4000 for the gas-works. The Town Clerk (Mr. E. Boase) explained that there was an overdraft at the bank on March 31 of £2164; and it was proposed out of the loan to pay off this sum and to spend £1000 on mains and services, £930 on alterations at the works and £370 on new meters. Mr. Grant, the Gas Manager, said the proposed expenditure would enable them to increase the output of gas by 40 or 50 p.ct. The Inspector suggested that the application should be amended so as to include the cost of a new gasholder which was evidently much needed.

No Cooker Complete without a Plate Rack

Supplied complete with white enamelled splasher, the whole forms an indispensable adjunct to every modern gas-cooker.

———and no Plate Rack so complete as Richmond's.

Since our introduction of this attachment it has become of universal manufacture, but the initiative still rests with us. Ours is the only pattern (protected by patent) that holds plates in a vertical position so all are equally and thoroughly heated—not merely the bottom one or two as in plates stood in a pile.

A Plate Rack does not burn gas, but, by the convenience it provides, it induces a more regular use of the Cooker.

THE RICHMOND GAS STOVE & METER CO., Ltd.,
WARRINGTON and LONDON.

Extensions at Honley.—The Honley Urban District Council have decided to purchase a carburetted hydrogen gas plant and gas exhausting machinery. Application is to be made to the Local Government Board for sanction to borrow a sum not exceeding £2000 to meet the cost of the new apparatus, and for power to borrow a further £2000 for the provision of new gas meters, cookers, &c.

Payment for Sunday Work at Huddersfield.—Following negotiations between the Huddersfield Corporation Wages Committee and representatives of the workmen of the gas and electricity departments, it was agreed last week, at an adjourned conference, that double time for Sunday work, instead of the existing time-and-a-half rate, should be paid as from April 1 until such time as a national award is made; the men agreeing to accept such award when it is made.

Nelson and its Gas Supply.—Following up the publication given last week (p. 322), of the figures relating to the Nelson Corporation Gas Department, it may now be noted that Mr. James Mitchell, the new Gas Engineer, in preparing the estimates for next year, has made allowance for a reduction in the price of gas by 6d. per 1000 c.ft. (from 4s. to 3s. 6d.) to take effect as from the last survey of meters.

Deficit on the Dukinfield Gas Undertaking.—The accounts of the Gas Department of the Dukinfield Corporation show a loss on the past year's working of more than £900. To make up the deficiency the Gas Committee have decided to increase the price of gas by 6d. per 1000 c.ft.—making it 4s. 6d.

A Gasholder Mishap at Port Glasgow.—Last Saturday week, early in the afternoon, without the slightest warning the crown of the gasholder at the Port Glasgow Gas-Works suddenly gave way. Six plates on the second ring from the crown plate were blown off in two pieces. The holder, which is one of 250,000 c.ft. capacity, was half full at the time, and in a very short while was grounded. Fortunately, the Engineer and Manager (Mr. R. W. Cowie) was on the works at the time; and, after an examination of the damage, he took steps to have the holder repaired. This was successfully done by the gas-works staff; and by 11.30 on Sunday forenoon, gas was again being put into the holder and at 6 p.m. it was turned on to the town. The Town Council are at present receiving tenders for plant for the new gas-works on a new site; and no doubt this latest occurrence will accelerate the preparations for the new works.

STOCK MARKET REPORT.

The Stock Exchange has had an agreeable week; markets (with some exceptions) being bright and firm, and business as active as available supplies of stock would permit. The Peace terms were generally considered satisfactory, having regard to the difficulty of getting all that one wants.

In the gilt-edged market, Home Government issues were not at their best. The 5 p.ct. Loan could barely touch 94 at the close, and the 4 p.ct. was down. Consols eased. Home Rails were in excellent demand, and hardened almost daily.

Business in the Gas Market was a fair counterpart of the previous week—*i.e.*, the aggregate of transactions was far in excess of recently antecedent averages, and of these the greater proportion was furnished by two Companies. Imperial Continental opened firm and advanced to 138 on Tuesday. But the difficulties of the Company's position presented at the general meeting that day operated a drop to 128 on Wednesday, a rally from which brought the closing mark up to 132; the quotation being 5 down. Primitivas were very active and firm, and quotations were unchanged. There was no change in undertakings within the United Kingdom beyond a fall of 1 in South Metropolitan.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 77½, 78, Brighton and Hove ordinary 95, Commercial 4 p.ct. 62, ditto 3½ p.ct. 58, Continental Union 49¼, European 12½, Gas Light ordinary 62, 62½, ditto preference 70½, ditto debenture 57½, Hastings and St. Leonards 3½ p.ct. 45½, Ilford "A" and "C" 71, Imperial Continental 134½, 135, 135¼, 135½, 136, 136½, 136½, Primitiva 33s. 9d., 35s., 35s. 3d., 36s., 36s. 3d., ditto preference 58s. 9d., 60s., 61s. 3d., South Metropolitan 62⅜, ditto preference 96¼, Tottenham "B" 65, Brighton and Hove preference 96½, Cheltenham 5 p.ct. 77½, Croydon 4 p.ct. debenture 65. On Tuesday, Bombay 6¼, Gas Light ordinary 61½, 61½, 61¾, 62, ditto preference 71, Imperial Continental 136, 136½, 136¾, 137, 137½, 138, Primitiva 36s. 3d., ditto preference 58s. 9d., 60s., 60s. 6d., 61s. 3d., 61s. 10½d., ditto debenture 74⅜, 75½, ditto debenture (1911) 52, South Metropolitan 62½, Southampton 69½, Tottenham "A" 90, ditto "B" 65, Croydon 4 p.ct. debenture 65½. On Wednesday, Bombay 5⅞, Continental Union 48½, Gas Light ordinary 61½, 62, 62½, ditto maximum 56, ditto preference 71½, 71⅜, Imperial Continental 128, 128½, 129, 129½, 130, 130½, 131, 132, 133, 133½, Primitiva preference 58s. 9d., 60s., ditto debenture 75, ditto debenture (1911) 50⅛, 51, South Metropolitan 62, ditto preference 97½, Southampton 4 p.ct. debenture 65. On Thursday, Bombay 6 1/16, 6¼, Croydon "B" 130, Gas Light ordinary 61¼, 61½, 61⅜, 62, Imperial Continental 127½, 128, 128½, 129, 129½, 130, 130½, 131, 132, ditto debenture 74, Primitiva 35s. 9d., 36s. 3d., ditto preference 57s. 6d., 58s. 9d., 60s., 60s. 7½d., River Plate 49, South Metropolitan 62½, 62⅜. On Friday, Brighton and Hove original 137, ditto ordinary 94½, Buenos Aires 49½, Continental Union 48, Gas Light ordinary 61½, 62, ditto preference 71¼, Hastings and St. Leonards 3½ p.ct. 45, 45½, Imperial Continental 129, 129½, 130, 130½, 131, 131½, 132, Lea Bridge 90½, 91, Primitiva 34s. 4½d., 35s., ditto preference 55s., 56s. 3d., 57s. 6d., 58s. 9d., ditto debenture (1911) 50½, 51, 51¼, South Metropolitan 62½, 62⅜, Tuscan 1⅝.

In the Money Market, rates were rather variable but did not range widely, being firm at the close. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When ex. Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	62—67	..
1,551,868	"	April 8	2½	2½%	Alliance & Dublin Ord.	59—64	48—50	..
874,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	61—63	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6	5⅞—6⅛	5⅞—6⅛
50,000	10	Feb. 26	16	12%	Bournemouth Gas and Water { 10 p.c.	29—30	20—22	..
888,110	10	"	7	7%	B 7 p.c.	15—15½	10—11	..
115,000	10	"	6	6/-	Pref. 6 p.c.	13½—14	9—9½	..
159,740	—	"	—	4%	4 p.c. Deb.	..	66—68	..
992,045	Stk.	Feb. 26	14	37/-	Brentford A Consolid.	261—266	76—79	77½—78
784,920	"	"	11	31/8	Do. B New	204—209	70—75	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	78—83	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—98	65—67	..
217,880	"	Feb. 26	11	7½%	Brighton & Hove Orig.	208—218	137—142	137
244,200	"	"	5½	5½%	Do. A Ord. Stk.	154—159	94—99	94½
933,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Mar. 26	12½	10%	British	44—45	30½—31½	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53	49½
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	1½—2	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7⅛—8½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,280	"	Feb. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	62—65	62
560,000	"	"	5½	26.3	Do. 3½ p.c. do.	103—105	59—62	58
475,000	"	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	48—53	48—49½
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	70—75	..
51,600	Stk.	Aug. 29	14½	12½%	Croydon A 10 p.c.	..	155—165	..
278,400	—	"	11½	9½%	Croydon B and C 7 p.c.	..	130—135	130
492,270	Stk.	"	6	6½%	Derby Con. Stk.	128—135	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	12½—13½	12½
16,298,975	Stk.	Feb. 10	4/17/4	80/-	Gas Light and Coke { 4 p.c. Ord.	98—102	61—63	61½—62½
2,600,000	"	"	8½	26.8	8½ p.c. max.	76—79	55—57	56
4,062,385	"	"	4	4%	4 p.c. Con. Pref.	96—99	70—72	70½—71½
4,674,850	"	June 11	8	8%	8 p.c. Con. Deb.	72½—74½	56—53	67½
180,000	"	"	10	10%	10 p.c. Bonds	..	..	..
82,500	"	Mar. 12	5	4½%	Hastings & St. L. 5 p.c.	..	59—64	..
358,740	"	—	3½	2¾%	Do. 3½ p.c	87—89	44—49	45—45½
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16½	7⅞—8½	..
86,600	Stk.	Sept. 12	9	8½%	Hornsey 7 p.c.	..	115—120	..
121,000	"	Mar. 12	7½	5¾%	Ilford A and C.	151—154	90—95	91
65,780	"	"	6⅔	4½%	Do. B	115—118	69—74	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	93—94	62—65	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	128—133	127½—138
1,235,000	"	Feb. 12	8½	8½%	Do. 8½ p.c. Deb. Red.	84—86	72—74	74
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	90—95	90½—91
2,498,905	"	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
					{ B	148—148		
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	"	Feb. 17	7/5/6	35%	Maidstone 5 p.c.	..	58—63	..
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4⅝	3½—3⅝	..
350,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	9½—10	..
1,875,892	Stk.	July 29	4½	3½%	Newcastle&Gatsh'd Con.	98½—99½	70½—71½	..
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	57—59	..
58,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9½—9⅞	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	4⅜—5½	..
60,000	50	Feb. 26	13	7½%	Portsea, Island B	125—131	76—81	..
100,000	50	"	12	6½%	Do. C	118—121	58—63	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1½—2	33/9—36/3
499,960	5	June 26	6	—	Do. 5 p.c. Pref.	4½—5	2½—3½	55/—61/3
591,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—98	74—76	74½—75½
600,000	Stk.	July 31	4	4%	Do. " 1911	..	50—53	50½—52
846,198	"	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	48—52	49
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
125,000	50	July 1	5	5%	{ 5 p.c. Deb.	41—49	40—42	..
135,000	Stk.	Mar. 12	10	5%	Sheffield A	228—234	80—84	..
209,984	"	"	10	5%	Do. B	228—234	80—84	..
528,500	"	"	10	4⅔%	Do. C	220—222	71—74	..
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	May 28	9	6/-	South African.	10½—11½	13—14	..
6,509,895	Stk.	Feb. 10	5/4/0	80/-	South Met. 4 p.c. Ord.	111—113	61—64	62—62⅝
260,000	"	July 12	—	5%	Do. Pref.	..	96—98	96½—97½
1,896,445	"	July 10	8	8%	Do. 5 p.c. Deb.	72½—74½	54—56	..
234,820	"	Feb. 26	8½	5%	South Shields Con. Stk.	167—169	111—113	..
962,795	"	"	6	3⅞%	S'th Suburb'n Ord. 5 p.c.	114—116	76—79	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	89—92	..
647,740	"	May 14	7½	3%	Southampton Ord.	99—102	69—71	69½
121,275	"	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	64—66	65
130,000	"	Feb. 12		4½%	Tottenham { A 5 p.c.	135—138	90—95	90
792,276	"	"	6	3%	District { B 3½ p.c.	116—117	66—67	65
181,955	"	June 26	4	4%	{ 4 p.c. Deb.	87—89	66—67	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	1⅝
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	102½—109	88—95	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	"	Feb. 26	8⅔	55/-	Wandsworth A 5 p.c.	151—156	88—93	..
255,686	"	"	6⅔	40/-	Do. B 3½ p.c.	129—134	68—73	..
108,075	"	"	—	38/6	Do. C	..	68—73	..
140,865	"	"	—	38/6	New Ordinary	..	68—73	..
353,000	"	"	6½	38/9	Wimbledon 5 p.c.	117—122	63—73	..
98,000	"	"	6⅔	40/-	Epsom 5 p.c.	121—126	70—75	..
88,416	"	June 26	5	3⅝	3 p.c. Deb. Stk.	66—69	50—52	..